PURCHASING / PRODUCTION

CANTON DROP FORGE

HIGH PERFORMANCE CLOSED DIE FORGINGS

4575 SOUTHWAY ST., S.W. • P.O. BOX 6902 • CANTON, OHIO 44706

PH. 216/477-4511

FAX 216/477-2046

8529

2

THIS ORDER NO. MUST APPEAR ON ALL INVOICES, PACKING SLIPS, BILL AND PACKAGES

PURCHASE ORDER

No 098252

DATE	PAGE
5/15/97	1

VENDOR TO:
PARSONS ENGINEERING -PF
19101 VILLAVIEW RD
STE 301
CLEVELAND OH 44119

SHIP TO:
CANTON DROP FORGE
4575 SOUTHWAY STREET S.W.
P.O. BOX 6902
CANTON OH 44706
ATTN: STOCK ROOM

UNLESS OTHERWISE NOTED, SALES TAX DOES NOT APPLY ON ITEMS ORDERED

SHIP VIA: ~~BEST WAY~~

FREIGHT TERMS:

LINE NO.	ITEM NO.	DESCRIPTION/COMMENTS	U/M	PROMISED DATE	QUANTITY ORDERED	UNIT COST	TOTAL COST
1		ENGINEERING ASSISTANCE FOR RECYCLING/TREATMENT OF STEAM CONDENSATE WHICH IS AN OILY EMULSION. SCOPE OF WORK TO BE AS PROPOSED ON MAY 7, 1997 PROPOSAL VIA LETTER FROM MICHAEL R. LEFFLER.					
6		COST NOT TO EXCEED $7,000.00					
8		CONFIRMED BY KEITH HOUSEKNECHT 5/8/97					
10		KJH ESCROW REQ. KH1062					CDF002326

Purchase Order Total .00

6/26/97- 725147- 6/16/97- 2497.55 (Thru 5/30/97)

8/1/97- 755151- 7/8/97- 3692.85 (Thru 6/27)

ALL ORDERS:
1. Terms and Conditions on reverse side are part of this Purchase Order.
2. Acceptance – Unless otherwise stated herein, this order must be accepted by the Seller signing and returning the attached acknowledgment copy to Buyer within 10 days from the date of this order, and it is understood that the commencement of any work or the performance of any services hereunder

STEEL ORDERS:
1. Certified test reports in triplicate are to accompany steel shipments. Discount will be taken from date of receipt of goods or test reports, whichever is later.
2. Do not deviate from established producing practice in fulfill-

INVOICE DAY OF SHIPMENT TO:
CANTON DROP FORGE
P.O. BOX 6902
CANTON, OH 44706

2. What sources of process and/or wastewater are available for recycle? What are the volumes of each source? What is the quality of each stream? What pretreatment is required to meet the water quality requirements of each potential re-use application?

PARSONS ENGINEERING SCIENCE, INC.

REMIT PAYMENT TO:
File 91849
Los Angeles, CA 90074-1849
Attn: Accounts Receivables

Street Address:
19101 VILLAVIEW ROAD, SUITE 301
CLEVELAND, OHIO 44119

Tel: (216) 486-9005
Fax: (216) 486-6119

INVOICE

2(b), 3

JULY 8, 1997

CLIENT REF. :
INVOICE NO. : 00755151
PROJECT NO. : 731549-T1
CLIENT NO. : 71275

TO: CANTON DROP FORGE, INC.
4575 SOUTHWAY STREET
CANTON, OHIO 44706

ATTN: MR. KEITH HOUSEKNECHT

PLEASE REMIT TO:
PARSONS ENGINEERING SCIENCE, INC
FILE 91849
LOS ANGELES, CALIFORNIA 90074-1849

FOR: CANTON DROP FORGE, WASTEWATER RECYCLING
AUTHORIZATION: P.O. #98252
WBS 01000 - INVESTIGATION
AMOUNT AUTHORIZED: $7,000.00

BILLING PERIOD: 5/31/97 THROUGH 6/27/97

	CUR. HOURS	CURRENT PERIOD THROUGH 6/27/97	CUM. HOURS	CUMULATIVE-TO-DATE THROUGH 6/27/97
WBS 01000 - INVESTIGATION				
DIRECT LABOR	29.1	$1,075.27	52.6	$1,896.26
OH & PROFIT @1.95 X D.L.		$2,096.78		$3,697.71
ODCS WITHOUT HANDLING		$.00		$75.63
ODCS W/HANDLING Rate		$496.00		$496.00
Markup: 5%		$24.80		$24.80
SUBTOTAL:		$3,692.85		$6,190.40
TOTAL THIS INVOICE:		$3,692.85		$6,190.40

AMT OK'D ON 7/29/97

CLIENT REF.:
INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR15C

2(6)
(3)

EMPLOYEE NAME	ADJ. DATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS	BILLING RATE	LABOR BILLING	PREMIUM BILLING
25 SENIOR SPECIALIST II							
STEPHEN E HALL	05/23/97	.50		.50	35.68	17.85	
CLASSIFICATION TOTALS		.50		.50		17.85	
35 SPVG SPECIALIST II							
MICHELLE MCDONALD		.10		.10	56.64	5.66	
CLASSIFICATION TOTALS		.10		.10		5.66	
90 PRINC ENG/SCIENTIST I							
MICHAEL R LEFFLER		27.00		27.00	109.80	2,964.75	
DAVID G JOHNSON		1.50		1.50	122.52	183.79	
CLASSIFICATION TOTALS		28.50		28.50		3,148.54	
TOTAL LABOR BILLING		29.10		29.10		3,172.05	

DETAIL OF PROFESSIONAL SERVICES

FOR THE PERIOD ENDING 6/27/97

CLIENT REF.:
INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR11C

2(b)
3

W/E DATE	EMPLOYEE NAME	EMPLOYEE CLASSIFICATION	ADJ. DATE	RATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS
01000	INVESTIGATION						
6/06/97	MICHAEL R LEFFLER	PRINC ENG/SCIENTIST I		109.80	14.00		14.00
6/13/97	MICHELLE MCDONALD	SPVG SPECIALIST II		56.64	.10		.10
6/13/97	MICHAEL R LEFFLER	PRINC ENG/SCIENTIST I		109.80	9.00		9.00
6/13/97	DAVID G JOHNSON	PRINC ENG/SCIENTIST I		122.52	1.50		1.50
6/20/97	STEPHEN E HALL	SENIOR SPECIALIST II	05/23/97	35.68	.50		.50
6/20/97	MICHAEL R LEFFLER	PRINC ENG/SCIENTIST I		109.80	4.00		4.00
	ITEM TOTALS				29.10		29.10
	TOTAL LABOR HOURS				29.10		29.10

2(b), 3

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 6/27/97
BY WBS/COST CODE

INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRFODC03
REF:

REFERENCE NUMBER	DESCRIPTION OF EXPENSES	AMOUNT
01000: INVESTIGATION		
9600	TEMP SERVICES & CONSULT	.00
9605	CONSULTING SERVICES-LIFE SCIENCE LABORAT	150.00
9605	CONSULTING SERVICES-QUANTERRA, INC.	346.00
	INVESTIGATION	496.00
	GRAND TOTAL OTHER DIRECT COSTS	496.00

DETAIL OF OTHER DIRECT COSTS

FOR THE PERIOD ENDING 6/27/97

BY JOB/WBS/COST CODE

2(b), 3

CLIENT REF.:
INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
731549		CANTON DROP FORGE, WASTEWATER					
	01000	INVESTIGATION					
		9605 CONSULTING SERVICES					
069705690	J4277	LIFE SCIENCE LABORATORIES	5/23/97			512	150.00
069706578	J6306	QUANTERRA, INC.	6/04/97			391	346.00
					ACCOUNT TOTAL		496.00
					INVESTIGATION		496.00
					JOB 731549 TOTAL		496.00
					TOTAL, OTHER DIRECT COSTS		496.00

PARSONS ENGINEERING SCIENCE, INC.

REMIT PAYMENT TO:
File 91849
Los Angeles, CA 90074-1849
Attn: Accounts Receivables

Street Address:
19101 VILLAVIEW ROAD, SUITE 301
CLEVELAND, OHIO 44119

Tel: (216) 486-9005
Fax: (216) 486-6119

INVOICE

2(b), 3

JULY 8, 1997

CLIENT REF. :
INVOICE NO. : 00755151
PROJECT NO. : 731549-T1
CLIENT NO. : 71275

TO: CANTON DROP FORGE, INC.
4575 SOUTHWAY STREET
CANTON, OHIO 44706

ATTN: MR. KEITH HOUSEKNECHT

PLEASE REMIT TO:
PARSONS ENGINEERING SCIENCE, INC
FILE 91849
LOS ANGELES, CALIFORNIA 90074-1849

FOR: CANTON DROP FORGE, WASTEWATER RECYCLING
AUTHORIZATION: P.O. #98252
WBS 01000 - INVESTIGATION
AMOUNT AUTHORIZED: $7,000.00

BILLING PERIOD: 5/31/97 THROUGH 6/27/97

	CUR. HOURS	CURRENT PERIOD THROUGH 6/27/97	CUM. HOURS	CUMULATIVE-TO-DATE THROUGH 6/27/97
WBS 01000 - INVESTIGATION				
DIRECT LABOR	29.1	$1,075.27	52.6	$1,896.26
OH & PROFIT @1.95 X D.L.		$2,096.78		$3,697.71
ODCS WITHOUT HANDLING		$.00		$75.63
ODCS W/HANDLING Rate		$496.00		$496.00
Markup: 5%		$24.80		$24.80
SUBTOTAL:		$3,692.85		$6,190.40
TOTAL THIS INVOICE:		$3,692.85		$6,190.40

DETAIL OF PROFESSIONAL SERVICES

FOR THE PERIOD ENDING 6/27/97

CLIENT REF.:
INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR15C

	EMPLOYEE NAME	ADJ. DATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS	BILLING RATE	LABOR BILLING	PREMIUM BILLING
25	SENIOR SPECIALIST II							
	STEPHEN E HALL	05/23/97	.50		.50	35.68	17.85	
	CLASSIFICATION TOTALS		.50		.50		17.85	
35	SPVG SPECIALIST II							
	MICHELLE MCDONALD		.10		.10	56.64	5.66	
	CLASSIFICATION TOTALS		.10		.10		5.66	
90	PRINC ENG/SCIENTIST I							
	MICHAEL R LEFFLER		27.00		27.00	109.80	2,964.75	
	DAVID G JOHNSON		1.50		1.50	122.52	183.79	
	CLASSIFICATION TOTALS		28.50		28.50		3,148.54	
	TOTAL LABOR BILLING		29.10		29.10		3,172.05	

DETAIL OF PROFESSIONAL SERVICES

FOR THE PERIOD ENDING 6/27/97

CLIENT REF.:
INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR11C

W/E DATE	EMPLOYEE NAME	EMPLOYEE CLASSIFICATION	ADJ. DATE	RATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS
01000	INVESTIGATION						
6/06/97	MICHAEL R LEFFLER	PRINC ENG/SCIENTIST I		109.80	14.00		14.00
6/13/97	MICHELLE MCDONALD	SPVG SPECIALIST II		56.64	.10		.10
6/13/97	MICHAEL R LEFFLER	PRINC ENG/SCIENTIST I		109.80	9.00		9.00
6/13/97	DAVID G JOHNSON	PRINC ENG/SCIENTIST I		122.52	1.50		1.50
6/20/97	STEPHEN E HALL	SENIOR SPECIALIST II	05/23/97	35.68	.50		.50
6/20/97	MICHAEL R LEFFLER	PRINC ENG/SCIENTIST I		109.80	4.00		4.00
	ITEM TOTALS				29.10		29.10
	TOTAL LABOR HOURS				29.10		29.10

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 6/27/97
BY WBS/COST CODE

INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRFODC03
REF:

REFERENCE NUMBER	DESCRIPTION OF EXPENSES	AMOUNT
01000: INVESTIGATION		
9600	TEMP SERVICES & CONSULT	.00
9605	CONSULTING SERVICES-LIFE SCIENCE LABORAT	150.00
9605	CONSULTING SERVICES-QUANTERRA, INC.	346.00
	INVESTIGATION	496.00
	GRAND TOTAL OTHER DIRECT COSTS	496.00

DETAIL OF OTHER DIRECT COSTS

FOR THE PERIOD ENDING 6/27/97

BY JOB/WBS/COST CODE

CLIENT REF.:
INVOICE NO.: 00755151
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
731549		CANTON DROP FORGE, WASTEWATER					
	01000	INVESTIGATION					
		9605 CONSULTING SERVICES					
069705690	J4277	LIFE SCIENCE LABORATORIES	5/23/97			512	150.00
069706578	J6306	QUANTERRA, INC.	6/04/97			391	346.00
					ACCOUNT TOTAL		496.00
					INVESTIGATION		496.00
					JOB 731549 TOTAL		496.00
					TOTAL, OTHER DIRECT COSTS		496.00

PARSONS ENGINEERING SCIENCE, INC.

REMIT PAYMENT TO:
File 91849
Los Angeles, CA 90074-1849
Attn: Accounts Receivables

Street Address:
19101 VILLAVIEW ROAD, SUITE 301
CLEVELAND, OHIO 44119

Tel: (216) 486-9005
Fax: (216) 486-6119

I N V O I C E

2(b)

AUGUST 8, 1997

CLIENT REF. :
INVOICE NO. : 00810971
PROJECT NO. : 731549-T1
CLIENT NO. : 71275

TO: CANTON DROP FORGE, INC.
4575 SOUTHWAY STREET
CANTON, OHIO 44706

ATTN: MR. KEITH HOUSEKNECHT

PLEASE REMIT TO:
PARSONS ENGINEERING SCIENCE, INC
FILE 91849
LOS ANGELES, CALIFORNIA 90074-1849

FOR: CANTON DROP FORGE, WASTEWATER RECYCLING
AUTHORIZATION: P.O. #98252
WBS 01000 - INVESTIGATION
AMOUNT AUTHORIZED: $7,000.00

BILLING PERIOD: 6/28/97 THROUGH 7/25/97

	CUR. HOURS	CURRENT PERIOD THROUGH 7/25/97	CUM. HOURS	CUMULATIVE-TO-DATE THROUGH 7/25/97
WBS 01000 - INVESTIGATION				
DIRECT LABOR		$.00	52.6	$1,896.26
OH & PROFIT @1.95 X D.L.		$.00		$3,697.71
ODCS WITHOUT HANDLING		$127.60		$203.23
ODCS W/HANDLING Rate		$.00		$496.00
Markup: 5%		$.00		$24.80
SUBTOTAL:		$127.60		$6,318.00
TOTAL THIS INVOICE:		$127.60		$6,318.00

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 7/25/97
BY WBS/COST CODE

INVOICE NO.: 00810971
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRFODC03
REF:

REFERENCE NUMBER	DESCRIPTION OF EXPENSES	AMOUNT
01000: INVESTIGATION		
9540	FREIGHT/EXPRESS/POSTAGE	112.08
9550	REPRODUCTION CHARGES	4.80
9560	COMMUNICATIONS	10.72
	INVESTIGATION	127.60
	GRAND TOTAL OTHER DIRECT COSTS	127.60

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 7/25/97
BY JOB/WBS/COST CODE

CLIENT REF.:
INVOICE NO.: 00810971
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
731549		CANTON DROP FORGE, WASTEWATER					
		01000 INVESTIGATION					
		9542 EXPRESS					
069705730	J2681	FEDERAL EXPRESS/U.S. COLLECTIO	6/10/97			512	8.67
069703905	A4337	FEDERAL EXPRESS	5/23/97			387	51.41
069703905	A4337	FEDERAL EXPRESS	5/23/97			387	49.80
					ACCOUNT TOTAL		109.88
		9543 POSTAGE					
	00052			6/26/97	POSTAGE	486	.32
	00052			6/26/97	POSTAGE	486	.78
	00052			7/18/97	POSTAGE	86	.78
	00052			7/18/97	POSTAGE	86	.32
					ACCOUNT TOTAL		2.20
		9551 COPIER CHARGES					
	30270			6/20/97	COPIER CHARGES	93	1.40
	30270			6/20/97	COPIER CHARGES	93	.40
	30270			6/20/97	COPIER CHARGES	93	.60
	30270			6/26/97	COPIER CHARGES	99	1.20
	30270			7/18/97	COPIER CHARGES	94	1.20
					ACCOUNT TOTAL		4.80
		9561 TELEPHONE CHARGES					
	00051			6/20/97	TELEPHONE CHARGES	102	1.82
	00051			6/20/97	TELEPHONE CHARGES	102	.44
	00051			7/11/97	TELEPHONE CHARGES	85	.43
	00051			7/18/97	TELEPHONE CHARGES	86	1.03
					ACCOUNT TOTAL		3.72
		9562 FAX CHARGES					
	00015			6/13/97	FAX CHARGES	81	3.00
	00015			6/13/97	FAX CHARGES	81	4.00

CLIENT REF.:
INVOICE NO.: 00810971
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
					ACCOUNT TOTAL		7.00
					INVESTIGATION		127.60
					JOB 731549 TOTAL		127.60
					TOTAL, OTHER DIRECT COSTS		127.60

PARSONS ENGINEERING SCIENCE, INC.

REMIT PAYMENT TO:
File 91849
Los Angeles, CA 90074-1849
Attn: Accounts Receivables

Street Address:
19101 VILLAVIEW ROAD, SUITE 301
CLEVELAND, OHIO 44119

Tel: (216) 486-9005
Fax: (216) 486-6119

INVOICE

2(b), 3

OCTOBER 13, 1997

CLIENT REF. :
INVOICE NO. : 00870845
PROJECT NO. : 731549-T1
CLIENT NO. : 71275

TO: CANTON DROP FORGE, INC.
4575 SOUTHWAY STREET
CANTON, OHIO 44706

ATTN: MR. KEITH HOUSEKNECHT

PLEASE REMIT TO:
PARSONS ENGINEERING SCIENCE, INC
FILE 91849
LOS ANGELES, CALIFORNIA 90074-1849

FOR: CANTON DROP FORGE, WASTEWATER RECYCLING
AUTHORIZATION: P.O. #98252
WBS 01000 - INVESTIGATION
AMOUNT AUTHORIZED: $7,000.00

BILLING PERIOD: 8/30/97 THROUGH 9/26/97

	CUR. HOURS	CURRENT PERIOD THROUGH 9/26/97	CUM. HOURS	CUMULATIVE-TO-DATE THROUGH 9/26/97
WBS 01000 - INVESTIGATION				
DIRECT LABOR	2.0	$74.44	56.6	$2,018.11
OH & PROFIT @1.95 X D.L.		$145.16		$3,935.32
ODCS WITHOUT HANDLING		$13.74		$218.75
ODCS W/HANDLING Rate		$.00		$496.00
Markup: 5%		$.00		$24.80
SUBTOTAL:		$233.34		$6,692.98
TOTAL THIS INVOICE:		$233.34		$6,692.98

FOR THE PERIOD ENDING 9/26/97

CLIENT REF.:
INVOICE NO.: 00870845
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR15C

EMPLOYEE NAME	ADJ. DATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS	BILLING RATE	LABOR BILLING	PREMIUM BILLING
90 PRINC ENG/SCIENTIST I							
MICHAEL R LEFFLER	09/05/97	2.00		2.00	109.80	219.60	
CLASSIFICATION TOTALS		2.00		2.00		219.60	
TOTAL LABOR BILLING		2.00		2.00		219.60	

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 9/26/97
BY WBS/COST CODE

INVOICE NO.: 00870845
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRFODC03
REF:

REFERENCE NUMBER	DESCRIPTION OF EXPENSES	AMOUNT
01000: INVESTIGATION		
9540	FREIGHT/EXPRESS/POSTAGE	1.24
9550	REPRODUCTION CHARGES	2.50
9570	CAD/GIS/COMPUTERS	10.00
	INVESTIGATION	13.74
	GRAND TOTAL OTHER DIRECT COSTS	13.74

DETAIL OF OTHER DIRECT COSTS

FOR THE PERIOD ENDING 9/26/97

BY JOB/WBS/COST CODE

CLIENT REF.:
INVOICE NO.: 00870845
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
731549	CANTON DROP FORGE, WASTEWATER						
01000	INVESTIGATION						
9543	POSTAGE						
00052				9/19/97	POSTAGE	105	1.24
					ACCOUNT TOTAL		1.24
9551	COPIER CHARGES						
30270				9/19/97	COPIER CHARGES	98	2.50
					ACCOUNT TOTAL		2.50
9573	MICRO-COMPUTER						
25001				8/29/97	COMPUTER	260	10.00
					ACCOUNT TOTAL		10.00
					INVESTIGATION		13.74
					JOB 731549 TOTAL		13.74
					TOTAL, OTHER DIRECT COSTS		13.74

PARSONS ENGINEERING SCIENCE, INC.

REMIT PAYMENT TO:
File 91849
Los Angeles, CA 90074-1849
Attn: Accounts Receivables

Street Address:
19101 VILLAVIEW ROAD, SUITE 301
CLEVELAND, OHIO 44119

Tel: (216) 486-9005
Fax: (216) 486-6119

I N V O I C E

2(b), 3

AUGUST 8, 1997

CLIENT REF. :
INVOICE NO. : 00810971
PROJECT NO. : 731549-T1
CLIENT NO. : 71275

TO: CANTON DROP FORGE, INC.
4575 SOUTHWAY STREET
CANTON, OHIO 44706

ATTN: MR. KEITH HOUSEKNECHT

PLEASE REMIT TO:
PARSONS ENGINEERING SCIENCE, INC
FILE 91849
LOS ANGELES, CALIFORNIA 90074-1849

FOR: CANTON DROP FORGE, WASTEWATER RECYCLING
AUTHORIZATION: P.O. #98252
WBS 01000 - INVESTIGATION
AMOUNT AUTHORIZED: $7,000.00

BILLING PERIOD: 6/28/97 THROUGH 7/25/97

	CUR. HOURS	CURRENT PERIOD THROUGH 7/25/97	CUM. HOURS	CUMULATIVE-TO-DATE THROUGH 7/25/97
WBS 01000 - INVESTIGATION				
DIRECT LABOR		$.00	52.6	$1,896.26
OH & PROFIT @1.95 X D.L.		$.00		$3,697.71
ODCS WITHOUT HANDLING		$127.60		$203.23
ODCS W/HANDLING Rate		$.00		$496.00
Markup: 5%		$.00		$24.80
SUBTOTAL:		$127.60		$6,318.00
TOTAL THIS INVOICE:		$127.60		$6,318.00

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 7/25/97
BY WBS/COST CODE

INVOICE NO.: 00810971
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRFODC03
REF:

REFERENCE NUMBER	DESCRIPTION OF EXPENSES	AMOUNT
01000: INVESTIGATION		
9540	FREIGHT/EXPRESS/POSTAGE	112.08
9550	REPRODUCTION CHARGES	4.80
9560	COMMUNICATIONS	10.72
	INVESTIGATION	127.60
	GRAND TOTAL OTHER DIRECT COSTS	127.60

DETAIL OF OTHER DIRECT COSTS

FOR THE PERIOD ENDING 7/25/97

BY JOB/WBS/COST CODE

CLIENT REF.:
INVOICE NO.: 00810971
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
731549	CANTON DROP FORGE, WASTEWATER						
01000	INVESTIGATION						
9542	EXPRESS						
069705730	J2681	FEDERAL EXPRESS/U.S. COLLECTIO	6/10/97			512	8.67
069703905	A4337	FEDERAL EXPRESS	5/23/97			387	51.41
069703905	A4337	FEDERAL EXPRESS	5/23/97			387	49.80
					ACCOUNT TOTAL		109.88
9543	POSTAGE						
	00052			6/26/97	POSTAGE	486	.32
	00052			6/26/97	POSTAGE	486	.78
	00052			7/18/97	POSTAGE	86	.78
	00052			7/18/97	POSTAGE	86	.32
					ACCOUNT TOTAL		2.20
9551	COPIER CHARGES						
	30270			6/20/97	COPIER CHARGES	93	1.40
	30270			6/20/97	COPIER CHARGES	93	.40
	30270			6/20/97	COPIER CHARGES	93	.60
	30270			6/26/97	COPIER CHARGES	99	1.20
	30270			7/18/97	COPIER CHARGES	94	1.20
					ACCOUNT TOTAL		4.80
9561	TELEPHONE CHARGES						
	00051			6/20/97	TELEPHONE CHARGES	102	1.82
	00051			6/20/97	TELEPHONE CHARGES	102	.44
	00051			7/11/97	TELEPHONE CHARGES	85	.43
	00051			7/18/97	TELEPHONE CHARGES	86	1.03
					ACCOUNT TOTAL		3.72
9562	FAX CHARGES						
	00015			6/13/97	FAX CHARGES	81	3.00
	00015			6/13/97	FAX CHARGES	81	4.00

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 7/25/97
BY JOB/WBS/COST CODE

CLIENT REF.:
INVOICE NO.: 00810971
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
					ACCOUNT TOTAL		7.00
					INVESTIGATION		127.60
					JOB 731549 TOTAL		127.60
					TOTAL, OTHER DIRECT COSTS		127.60

PARSONS ENGINEERING SCIENCE, INC.

19101 Villaview Road, Suite 301 • Cleveland, Ohio 44119 • (216) 486-9005 • Fax (216) 486-6119

PARESCL/597/Doc/EJK7-06

2(b), 7, 1(c)

7 May 1997

Mr. Keith Houseknecht
Manager, Plant Engineering
CANTON DROP FORGE, INC.
4575 Southway Street
Canton, Ohio 44706

Subject: Proposal to Provide Engineering Assistance
Wastewater Recycling and/or Treatment

Dear Mr. Houseknecht:

Subsequent to our meeting with you on 10 April 1997, and the several telephone conversations which we have completed in the interim, Parsons Engineering Science, Inc. (Parsons ES) understands that Canton Drop Forge, Inc. (CDF) is interested in receiving a proposal to address certain process water streams and their impacts on subsequent operations, current and potential discharge(s) to the public-owned treatment works (POTW), and the on-site Lagoon system. In developing this proposal, Parsons ES has considered the information provided during the previously described discussions as well as that contained in the Proposed Oily Process Wastewater and Steam Flow Diagram, as amended, and the list of process flows under consideration.

Specifically, CDF has indicated that a residual oily emulsion, which is generated when lubricating oil is injected into process steam used in the operation of the plant's steam hammers, has been observed in the low pressure steam/condensate manifold and may be creating adverse impacts (probable occurrence of foaming in the boilers, etc.), when the condensate stream is re-used in subsequent operations. Additionally, subsequent to the hot process softener, lime precipitation appears to be occurring for a distance up to one (1) mile from the CDF discharge point into the sanitary sewer-line. As a consequence, the sewer district is reluctant to permit the discharge to continue and will likely be less receptive to a potential request from CDF to receive any additional streams (i.e., pretreated condensate).

POSSIBLE

NOT USED? EXHAUST STEAM USED

UNWILLING

WHAT IS THERE OBLIGATION A PUBLIC TREATMENT WORKS

OVERALL PROJECT APPROACH

Before the approach which best meets CDF's needs can be identified, an investigation is required to answer some important questions. Parsons ES can accomplish this investigation most efficiently with assistance, as needed, from CDF. Some key questions are listed below.

1. What are the potential re-uses of the identified process streams (i.e., condensate and hot process softener)? How much volume can be used at each process? What are the water quality requirements for each process stream?

2. What sources of process and/or wastewater are available for recycle? What are the volumes of each source? What is the quality of each stream? What pretreatment is required to meet the water quality requirements of each potential re-use application?

Post-it® Fax Note 7671	Date 5/7	# of pages ▶ 4
To Keith Houseknecht	From Ed Hackett	
Co./Dept. Canton Drop Forge	Co. Parsons ES	
Phone #	Phone #	
Fax # 330-477-2046	Fax #	

PARSONS

CDF002349

CDF has identified at least 13 possible sources and/or re-use applications, which were provided in a listing on 1 May 1997. The pretreatment required for each stream will vary based on the nature of the stream and the requirements of the recycled water user. It is Parsons ES' understanding that the least possible pretreatment, which will satisfactorily and consistently provide water for re-use in one of the prospective applications, is the ultimately desired result of this effort.

A combination of one or more operations may be appropriate. Likely candidate processes for addressing the condensate stream are (ultra)filtration, emulsion breaking, and oil removal. Other processes may be considered depending on the requirements to make a particular waste stream suitable for a particular reuse.

3. What are the potential volumes and qualities of process and/or wastewater to be discharged to the sewer or on-site Lagoon system? What are the pretreatment requirements for (continued) discharge to the sewer and POTW?

This question deals primarily with the existing discharge of the hot process softener stream to the sanitary sewer. Additionally, pretreatment requirements for discharge of the condensate stream to the sewer are contemplated.

PROPOSED SCOPE OF WORK

Parsons ES proposes to provide the services described in the following three tasks:

Task 1--Investigation/Evaluation Assistance

Parsons ES will review the existing sources of process and wastewater, the potential points of reuse, the pretreatment requirements for re-use and/or discharge to the sanitary sewer and potential alternatives for combining process and wastewater streams, as appropriate. The evaluation will also consider the potential disposition of any residuals which may be generated as a result of applying these alternatives. On-site data gathering efforts will be limited to a one-day effort involving two (2) Parsons ES personnel experienced in industrial process and wastewater treatment. During this exercise, the processes under consideration will be inspected, key operating personnel familiar with the issues will be interviewed, the previously referenced process flow diagram will be verified (for the purposes of this analysis only), process flow, pressure, temperature and quality data will be obtained for critical points in the CDF plant and samples will be collected from four (4) points for determination of water quality and pretreatment alternative feasibility. If additional sampling or other on-site activities are required, the level of effort and costs to complete same will be identified to CDF at that time.

Information on the following items will be collected during the one-day, on-site visit by Parsons ES personnel:

- Process water use and wastewater generation flow rates;
- Water quality requirements for boiler makeup and other identified candidate process streams;
- Process flow diagram revisions required to address the process and wastewater issues under consideration in this effort;

- Available characterization information for each applicable process and wastewater stream;
- Description and application of current and planned process/wastewater treatment processes;
- Description and status of discharges to the Lagoon system and sanitary sewer; and
- Other information critical to determining the feasibility of the recommended pretreatment options (e.g., spatial constraints).

Task 2--Treatability Testing and Analyses

Parsons ES will analyze key quality parameters (e.g., pH, total oil & grease, total dissolved solids) for each stream under consideration. Additionally, we will conduct treatability testing, either internally or in conjunction with appropriate equipment suppliers, on two (2) of the samples collected at the CDF plant to determine the most cost-effective approach(es) for achieving the required pretreatment levels for potential re-use applications and/or discharge. We will focus our attention on alternatives, such as ultrafiltration, which do not require significant operations and maintenance time, chemical additions, or cost impacts.

Task 3--Alternatives Development and Reporting

Based on the evaluations completed in Tasks 1 and 2, Parsons ES will identify several (up to three) potential alternatives for addressing the condensate and hot process softener stream issues. This evaluation will consider potential re-use of the process flows under evaluation through re-routing within the facility as well as pretreatment prior to discharge to the sanitary sewer. Screening factors used in this evaluation will include capital costs, O&M costs, availability, compatibility and spatial considerations (i.e., where will it fit). Simple block diagrams will be developed for each alternative showing the source flow rates, re-use flow rates, and the capacities of any storage vessels and/or sizes of any major treatment components, as appropriate. Budgetary cost estimates (+/-30%) will be identified for the proposed approaches.

Following completion of the alternatives evaluation, we will prepare a letter report summarizing the results of the work completed. The alternative(s) best meeting CDF's objectives will be recommended for CDF consideration and implementation. Equipment model numbers and costs for long-lead capital equipment, as appropriate, will be provided. Parsons ES will also provide an estimate for our design and implementation of the recommended approach(es) as a subsequent phase of this effort.

PROJECT TEAM

The Project Manager for the proposed project will be Michael R. Leffler, PE, Associate. Mr. Leffler has managed several similar studies for process re-use and pretreatment water re-use and/or discharge to POTW systems for other iron and steel fabrication mills and operations in the Northeast Ohio area. He will be assisted, as necessary, by Mr. Doug Morrison, during the Task 1 investigation and treatability studies, Mr. David G. Johnson, PE, as technical reviewer, and other Parsons ES staff, as necessary. Biographical data sheets are attached for the key project personnel.

SCHEDULE

It is estimated that this work can be completed within three weeks of authorization, assuming that appropriate assistance from vendors and suppliers of the targeted technologies is available on a highly responsive basis.

COMPENSATION

Parsons ES proposes to perform the services offered in this proposal on a "time and expenses, cost not-to-exceed" basis. Labor and expenses will be invoiced in accordance with the terms and conditions of our previously submitted (11 April 1997) Engineering Services Agreement (ESA). Parsons ES will not invoice CDF for more than $7,000 without further authorization from CDF. This budget estimate assumes that the project can be initiated on or by 9 May 1997.

Our not-to-exceed amount is based on the following:

Task 1--20 hours of engineering plus support services, supplies, analyses and expenses
Task 2--20 hours of engineering plus support services and expenses
Task 3--15 hours of engineering plus support services and expenses

Should additional assistance be desired (e.g., engineering design or implementation of the selected alternative(s)), Parsons ES would be pleased to provide those services in accordance with the same schedule of compensation with an appropriate increase in the authorized not-to-exceed amount.

If this proposal is acceptable to you, please issue a purchase order referencing this proposal and our ESA. This will serve as our authorization to proceed. Thank you for the opportunity to present this proposal.

If you have any questions or wish to discuss the proposal, please do not hesitate to call either Mr. Leffler or Edward Karkalik at (216) 486-9005.

Very truly yours,

PARSONS ENGINEERING SCIENCE

Wilson H. Rownd, PE
Vice President/Manager

Michael R. Leffler, PE
Project Manager

WHR/MRL/dee
Attachments
cc: CMB (File)

O/C 15
Primary

2(b)

- HPS Blowdown
- Boiler Blowdown
- Scrubber Water
- Exhaust Manifold Separator
- HPS Inlet Separator
- Steam Heater Condensate
- Compressor Cooling Water
- Recirculating System Overflow
- Anvil Heater Line
- Lime Mixing Tank Drain
- Polymer Tank Drain
- Scrubber Recirc Tank Overflow
- Dewatering Screen

2(b)

HPS BLOWDOWN
BOILER BLOWDOWN
SCRUBBER WATER
EXHAUST MANIFOLD SEPARATOR
HPS INLET SEPARATOR
STEAM HEATER CONDENSATE
COMPRESSOR COOLING WATER
RECIRCULATING SYSTEM OVERFLOW
ANVIL HEATER LINE
LIME MIXING TANK DRAIN
POLYMER TANK DRAIN
SCRUBBER RECIRC TANK OVERFLOW
DEWATERING SCREEN

PARSONS ENGINEERING SCIENCE, INC.

19101 Villaview Road, Suite 301 • Cleveland, Ohio 44119 • (216) 486-9005 • Fax (216) 486-6119

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PARESCL/597/Dee/EJK7-06

RECEIVED

MAY 12 1997

CANTON DROP FORGE

7 May 1997

Mr. Keith Houseknecht
Manager, Plant Engineering
CANTON DROP FORGE, INC.
4575 Southway Street
Canton, Ohio 44706

Subject: Proposal to Provide Engineering Assistance
Wastewater Recycling and/or Treatment

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Specifically, CDF has indicated that a residual oily emulsion, which is generated when lubricating oil is injected into process steam used in the operation of the plant's steam hammers, has been observed in the low pressure steam/condensate manifold and may be creating adverse impacts (probable occurrence of foaming in the boilers, etc.), when the condensate stream is re-used in subsequent operations. Additionally, subsequent to the hot process softener, lime precipitation appears to be occurring for a distance up to one (1) mile from the CDF discharge point into the sanitary sewer-line. As a consequence, the sewer district is reluctant to permit the discharge to continue and will likely be less receptive to a potential request from CDF to receive any additional streams (i.e., pretreated condensate).

OVERALL PROJECT APPROACH

Before the approach which best meets CDF's needs can be identified, an investigation is required to answer some important questions. Parsons ES can accomplish this investigation most efficiently with assistance, as needed, from CDF. Some key questions are listed below.

1. What are the potential re-uses of the identified process streams (i.e., condensate and hot process softener)? How much volume can be used at each process? What are the water quality requirements for each process stream?

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CDF has identified at least 13 possible sources and/or re-use applications, which were provided in a listing on 1 May 1997. The pretreatment required for each stream will vary based on the nature of the stream and the requirements of the recycled water user. It is Parsons ES' understanding that the least possible pretreatment, which will satisfactorily and consistently provide water for re-use in one of the prospective applications, is the ultimately desired result of this effort.

A combination of one or more operations may be appropriate. Likely candidate processes for addressing the condensate stream are (ultra)filtration, emulsion breaking, and oil removal. Other processes may be considered depending on the requirements to make a particular waste stream suitable for a particular reuse.

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PROJECT TEAM

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SCHEDULE

It is estimated that this work can be completed within three weeks of authorization, assuming that appropriate assistance from vendors and suppliers of the targeted technologies is available on a highly responsive basis.

COMPENSATION

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If you have any questions or wish to discuss the proposal, please do not hesitate to call either Mr. Leffler or Edward Karkalik at (216) 486-9005.

Very truly yours,

PARSONS ENGINEERING SCIENCE

Wilson H. Rownd, PE
Vice President/Manager

Michael R. Leffler, PE
Project Manager

WHR/MRL/dee
Attachments
cc: CMB (File)

Biographical Data

DAVID G. JOHNSON

Environmental Engineer

EXPERIENCE SUMMARY

Management and technical direction of numerous hazardous and solid waste and industrial wastewater projects throughout the U.S. and abroad, with sixteen years of active professional practice. Major areas of expertise include industrial wastewater and groundwater treatment processes including biological treatment, carbon adsorption, air stripping, chemical precipitation, etc., as well as pollution prevention/waste minimization, storm water management, and hazardous waste site investigation and remediation.

EXPERIENCE RECORD

1980-Date Parsons Engineering-Science. **Office Manager** (1995-Date); Technical and administrative management of 90 engineers, geologists, scientists, and support personnel. Projects include RCRA/CERCLA studies and remedial designs, site investigations, RI/FS, AST/UST tank removal and remedial projects, industrial wastewater studies and design, pollution prevention, air, wastewater, and hazardous waste permitting, and other environmental projects.

Engineering Technical Manager (1993-1995); Manager, Industrial Waste Group (1986-1993); Manager, Environmental Studies Group (1985-1986); Project Manager (1980-1985). Management and technical direction of wastewater, hazardous waste, and other environmental assessments, studies and design projects for numerous industrial and governmental clients, including clients in the petroleum refining, petrochemical, chemical, pharmaceutical, metals processing, transportation, food processing, regional waste treatment, semiconductor, and electronics industries, among others. Conducted environmental Phase I assessments and audits of numerous industrial facilities covering the areas of PCBs, water, wastewater, asbestos, air, and solid and hazardous waste. Conducted audits of municipal and industrial wastewater treatment systems for EPA Region VI. Technical direction of pollution prevention/waste minimization projects, including development of BMP and Stormwater Pollution Prevention (SWPPP) Plans. Stormwater sampling, analysis, and permitting. Conducted bench-scale chemical and biological treatability studies on coal gasification, petroleum refining, petrochemical, aluminum processing, and other industrial wastewaters, involving biological treatment, carbon adsorption, air stripping, oil/water separation, chemical precipitation, chemical oxidation, and other unit processes. Evaluated existing industrial wastewater treatment facilities, and prepared conceptual wastewater treatment system designs for petroleum refining, petrochemical, aluminum manufacturing and other facilities. Managed a project to investigate the feasibility of thermal enhancement of soil vapor extraction for remediation of contaminated soils at a New Jersey chemical facility. Managed design of sludge handling equipment for several industrial facilities. Provided sampling and permit assistance to industrial clients for new and modified water, wastewater, stormwater, and/or hazardous waste permits. Prepared environmental assessments for several major projects, including a major airport expansion and a new Central Florida phosphate mine.

Managed several major solid and hazardous waste projects, including several RCRA and CERCLA projects to conduct preliminary site assessments and site inspection activities at over 1,500 potential hazardous waste sites in Texas. Managed projects to conduct investigations of 20 hazardous waste sites and 13 sanitary, construction and demolition, and sludge landfills in New York State. Managed RI/FS activities at a former specialty chemical facility in New Jersey, including a pilot-scale soil vapor extraction (SVE) study, and a wellfield contaminated with TCE in New York State. Managed a project to assess the feasibility of the use of thermal enhancement of SVE at a New Jersey chemical facility. Also managed a project to conduct solid waste disposal facility inspections at 257 industrial facilities.

Conducted Phase 1 Installation Restoration Program projects at four Air Force bases and a Phase II investigation at Westover AFB, MA for the Department of Defense to identify practices potentially resulting in groundwater contamination and contaminant migration, including ranking of identified sites for further investigations. Prepared hazardous waste management plans to meet RCRA requirements for several refineries and petrochemical plants in Texas, Louisiana, and New Mexico. Evaluated fly ash handling alternatives and coal pile runoff for an industrial complex in Portugal. Managed a project to evaluate sludge handling alternatives for a regional industrial wastewater treatment plant. Managed projects evaluating potential groundwater contamination for several refinery and other manufacturing facilities. Provided evaluation and coordination of major hydrocarbon recovery program involving over 70 recovery wells, 250 observation wells, and recovered groundwater treatment.

1978-1980 Espey, Huston & Associates, Inc., Houston, Texas. **Staff Engineer I.** Preparation of federal flood insurance studies for 13 coastal communities and 4 counties in Texas. Responsible for the data collection, hydrologic, and hydraulic analyses using the computer program HEC-2, and report writing, as well as coordination of staff engineers and technicians involved in the project. Designed drainage ditch improvements for several Gulf Coast communities.

1977-1978 University of Texas, Austin, Texas, Dept. of Engineering (Environmental Health). **Research Assistant II.** Performed literature review and analysis of data pertaining to the sources and influx of nitrogen species into confined aquifers, and the fate of ammonia used for in situ uranium solution mining.

1976-1977 University of Texas, Austin, Texas, Dept. of Civil Engineering. **Research Assistant II.** Performed data reduction and analysis and application of computer models to predict dynamic wheel loadings on pavements and bridges.

EDUCATION

B.S. in Civil Engineering with Highest Honors, 1977, University of Texas, Austin, Texas

M.S. in Engineering (Environmental Health), 1979, University of Texas, Austin, Texas

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer (New York, 1987, No. 064133)

Water Environment Federation

TAPPI

PUBLICATIONS

"Literature Review and Preliminary Analysis of Inorganic Ammonia Pertinent to South Texas In-Situ Leaching," with others. Center for Research in Water Resources Report No. CRWR-155, EHE 78-01, 1978.

"Investigation of the Fate of Ammonia From In-Situ Uranium Solution Mining," with others. Technical Report EHE 79-01, 1979.

"RCRA 3012 and Superfund Enforcement at the State Level," with others. In Management of Uncontrolled Hazardous Waste Sites, Fifth National Conference, November 1984.

"Cost Model for Selected Technologies for Removal of Gasoline Components in Groundwater", American Petroleum Institute (API) Publication 4422, February 1986.

PAPERS AND PRESENTATIONS

"Nitrification and In-Situ Uranium Solution Mining," presented at the 1979 SPE Annual Technical Conference and Exhibition, September 1979, and at the Texas Section ASCE Fall 1979 meeting, October 1979, at College Station (coauthor M. Humenick).

"Industrial Wastewater Pretreatment: History, Status, and Outlook," presented at the Mohawk Valley Environmental Information Exchange, May 1993.

Biographical Data

MICHAEL R. LEFFLER

Chemical/Environmental Engineer

EXPERIENCE SUMMARY

Extensive experience in environmental studies and permitting, wastewater treatment plant design and operations, and other engineering studies for both industrial and municipal clients.

EXPERIENCE RECORD

1974-Date Parsons Engineering Science (Parsons ES). **Project Manager** (1979-Date). Engineering Department Manager (1991-1993); Department Head; Industrial Wastes, Plant Operations and Environmental Studies (1988-1990). Coordinated all activities of the Parsons ES Cleveland Engineering Department and Industrial Wastes, Plant Operations and Environmental Studies Group, respectively.

Conducted wet weather bypass investigation for 22.5 mgd municipal wastewater treatment plant and collection system. Work included evaluation of alternatives to eliminate bypassing and the impact of blending waste streams on the final effluent. Prepared a Satellite Sewer Discharge Control Program for imposing NPDES requirements on customer cities.

Assisted in Comprehensive Evaluation of Combined Sewer System for a large city to determine methods to eliminate capacity problems.

Prepared preliminary design and cost estimates for wastewater treatment systems for two major organic chemical manufacturing facilities. Estimates were prepared for two systems at each location and included biological treatment, chemical oxidation, steam stripping, and sand filtration.

Evaluated existing system, designed modifications and provides ongoing operations assistance for a package extended aerative wastewater treatment systems.

Evaluated the need and options for wastewater pretreatment system at a steel rolling mill, designed system modifications, prepared permit to install and indirect discharge permit applications, assisted in securing EPA permits, and assisted as startup and initial operation of the system. Treatment included oil and grease removal.

Supervised sewer flow metering at 19 locations for one month and utilized data to allocate the operating costs of a wastewater treatment plant among four municipalities.

Supervised field location of approximately 25,000 feet of potable water lines and appurtenances on a college campus and preparation of AutoCad drawings for use in a GIS System.

Performed comprehensive studies for industrial client to identify and correct sources of non-compliant discharges under stormwater NPDES permit and municipality issued industrial pretreatment permit. Work included evaluations and optimization assistance for a 25 gpm chrome reduction/metals removal system.

Supervised treatability testing and design of emulsified oil removal system for an industrial client.

Served as Project Manager for design of modifications to convert an aerated lagoon treatment system to an activated sludge system with recycle for an industrial facility, prepared permit to install application, prepared Operating Guide, provided operator training and supervised startup of the modified facility.

Supervised operation of a 22.5 mgd wastewater treatment plant with fixed film biological reactors under a 10-year operations contract.

Developed computerized data management system for a 22.5 mgd municipal wastewater treatment facility.

Supervised preparation of Oil Spill Prevention and Countermeasure Plans (SPCC) for five roofing products manufacturing facilities and three specialty steel mills.

Served as Project Manager for design of a 300 gpm metals removal facility to remove arsenic and hexavalent chromium from landfill leachate.

Designed piping and control systems for recovering hydrocarbons from soil by vapor extraction and assisted in data analysis for operating system.

Performed evaluation and designed modifications to a 13 mgd plant water pumping system for a large industrial facility to accommodate aggressive water use reduction program.

Conducted testing and evaluation of an industrial fume scrubber for acid fumes.

Supervised start-up, provided operations assistance, developed operator training program, and implemented maintenance schedules and records management system for a 50 mgd physical/chemical wastewater treatment plant and 300 mgd Combined Sewer Overflow (CSO) Treatment Facility; wastewater treatment processes included lime precipitation, recarbonation, pressure filtration, carbon adsorption, disinfection, centrifuge sludge dewatering and incineration; CSO treatment included screening and sedimentation with up to 6 million gallons storage capacity. Work included preparation of applications for permit to operate, negotiation of applicable air pollution limits, and coordination of stack testing for two incinerators.

Responsible for preparation of Operation and Maintenance (O&M) Manuals for a 66 mgd wastewater pumping station including an odor control system utilizing ozone, two industrial facilities and a hazardous waste incineration system. Served as technical director for preparation of O&M Manual for a sludge composting facility and a 33 mgd, two-stage biological treatment plant. Supervised preparation of O&M Manuals, Start-up and Operator Training at a 12 mgd activated sludge plant and two wastewater treatment plants using fixed film biological reactors with capacities of 35 and 45 mgd.

Project Engineer (1974-1979). Responsible for systems specification writing, design and operations reviews, plant start-up, and troubleshooting for advanced wastewater treatment facilities. Designed chemical feed systems for an industrial waste treatment facility. Conducted a feasibility study on use of chlorinated industrial waste in domestic wastewater treatment. Conducted an odor investigation at a river dredging disposal site. Work included air sampling, odor quantification using an odor panel and sulfur determination using a sulfur chromatograph. Prepared oil Spill Prevention and Countermeasure Plan (SPCC) for an automotive equipment manufacturing complex.

Directed start-up of centrifuge sludge dewatering system, developed a staffing plan, and prepared an O&M Manual for a 50 mgd physical/chemical wastewater treatment plant. Involved in start-up and O&M Manual preparation for a 4 mgd pure oxygen activated sludge plant with tertiary treatment. Evaluated operations of sludge handling facilities at a 25 mgd municipal wastewater treatment plant.

1972-1974 Havens and Emerson, Ltd., Cleveland, Ohio. **Project Engineer.** Project Engineer responsible for the design of phosphorus removal facilities, chemical storage and handling systems, polymer feed system, and pH adjustment system including associated tanks, buildings and appurtenances for an existing 12 mgd activated sludge treatment facility. Staff Engineer on various aspects of design of a 22 mgd pure oxygen activated sludge wastewater treatment plant. Responsibilities included chemical handling systems, grit removal, and complete checking of plant hydraulics.

EDUCATION

B.S. Engineering (Environmental), 1972, Purdue University, West Lafayette, Indiana
M.S. Chemical Engineering, 1977, Cleveland State University, Cleveland, Ohio

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer (Ohio 1977, No. E-41889)
Certified Class III Wastewater Works Operator (Ohio 1981, No. 3-81-53)
American Academy of Environmental Engineers (Diplomate)
American Institute of Chemical Engineers
Water Environment Federation

PAPERS AND PRESENTATIONS

"Computer Control of a Physical-Chemical Treatment Plant", presented at the Fifty-Ninth Annual Meeting of the Ohio Water Pollution Control Conference, June 1985 (co-authors: L. Debevec and T. P. Meister)

Biographical Data

DOUGLAS A. MORRISON

Chemical/Environmental Engineer

EXPERIENCE SUMMARY

Project manager/project engineer with experience in the treatment of industrial solid and liquid wastes. Experienced in conceptual design, biological and physical/chemical treatability studies, feasibility studies, detailed design for wastewater, groundwater, and leachate treatment systems and providing air engineering services. Experienced in the conduct of pollution prevention/waste minimization studies for various industrial and federal clients.

EXPERIENCE RECORD

1991-Date Parsons Engineering Science. **Environmental/Chemical Engineer.**

Detailed Design (Typical Projects):

Provided detailed design and specifications package for an oil/water separation system for treating storm water runoff at a vehicle maintenance facility for a major interstate busing company.

Served as a project engineer on the closure design of a 60-acre municipal landfill. The design included waste consolidation, a multi-layered low permeability cap, a leachate collection system, and a trench gas venting system.

Provided detailed design and specifications package for a groundwater/leachate collection and treatment system. System components include equalization, pH neutralization, and multi-media sand filtration.

Treatability Studies (Typical Projects):

Organized and conducted an extensive battery of studies for the treatment of pharmaceutical wastewaters. Bench-scale studies conducted included anaerobic digestion of waste activated sludge (WAS) and mycelial solids, aerobic digestion of WAS and mycelial solids, lime stabilization of digested solids, serum bottle anaerobic toxicity assessments of process wastewaters/solvents, batch nitrification inhibition studies of process wastewaters/solvents, and sludge conditioning of WAS generated from treatment of pharmaceutical wastewaters. Coauthored the technical reports detailing the results of these studies.

Supervised the operation of an alkaline hydrolysis pilot-scale treatability study for the destruction of iron-complexed cyanide leachate. Coauthored the technical report detailing the results of this study.

Organized and conducted a battery of aerobic digestion studies on WAS generated in the treatment of baby food manufacturing wastewaters. Study determined anticipated kinetic coefficients and temperature dependency which was utilized in the detailed design of full-scale solids handling facilities.

Feasibility Studies (Typical Projects):

Conducted a feasibility study for the remediation of a State Superfund Site containing soils and building surfaces contaminated with PCBs and heavy metals.

Assisted in a feasibility study for the remediation of an operating jet fuel distribution facility contaminated with JP-4 and creosols.

Prepared a feasibility study for the remediation of a State Superfund Site consisting of a landfill containing municipal/industrial refuse. The recommended alternative, which received state approval, included a Part 360 Cap with no provisions/requirements for groundwater remediation.

Assisted in the preparation of a feasibility study for a 70 acre USEPA superfund site highly contaminated with lead. Efforts included developing remedial alternatives and preparing detailed remedial cost estimates.

Conceptual Design (Typical Projects):

Assisted in the preparation of conceptual design reports for the treatment of complex wastewater discharges for pharmaceutical manufacturing firms located in Pennsylvania, New Jersey and New York. Efforts included wastewater sampling/characterization, review of potential management/treatment technologies, and the development of process trains which would provide adequate treatment of these discharges.

Have provided conceptual designs for numerous facilities for groundwater, leachate, and process wastewater recovery and treatment. A conceptual design for a "zero discharge" pressure washing system has been incorporated in over 100 facilities for a nation-wide truck engine repair corporation.

Pollution Prevention/Waste Minimization (Typical Projects):

Coauthored a waste minimization report for a Fortune 100 metal fabricating/printed circuit board manufacturer. Report included a review of innovative technologies, alternative processes, safe substitutes, as well as recommended process modifications to reduce waste stream toxicity/volume.

Prepared a Pollution Prevention Opportunity Assessment for a phenolic resin formulating/fabrication facility. The report concentrated on the facility's hazardous waste streams; however solid waste reduction measures were also evaluated. Detailed recommendations, including an economic feasibility analysis, were developed which formulated a pollution prevention implementation strategy.

Assisted in the preparation of a Pollution Prevention Opportunity Assessment for a U.S. Army post (Fort Drum, New York). Primary work efforts included obtaining process data and accurate waste generation information for the post and completing the economic analysis for the P2 opportunity assessment. Economic analyses (including sensitivity analysis) were conducted for 49 pollution prevention alternatives.

Assisted in the preparation of an annual update for a Hazardous Waste Reduction Plan (HWRP) for a master aluminum production facility.

Facility Prevention Plans (Typical Projects):

Have prepared/managed a variety of facility prevention plans including: Spill Prevention, Control and Countermeasures plans (SPCCs), Storm Water Pollution Prevention plans (SWPPPs), Best Management Practices plans (BMPs), Chemical Bulk Storage Spill Prevention Reports (CBS SPRs), Facility Response Plans (FRPs), Process Safety Management plans (PSMs), and New York State Contingency Plans (required for large-quantity generators).

Responsible for managing storm water compliance for a major interstate busing company which has seeked coverage under a USEPA group permit. Have managed the preparation of notice of intents (NOIs) and SWPPPs for eighteen (18) facilities located in twelve (12) states who currently do not recognize USEPA group permits.

Project Manager for preparation of site-specific SPCCs for thirteen (13) locations for a major interstate busing company. Have managed professional engineers in eight separate ES offices to complete SPCC preparation/SPCC 3-year update projects in a timely, cost-effective manner. Project engineer in the preparation of two SPCC plans for a major New York State utility.

Air Engineering Services (Typical Projects):

Experienced in many facets of air-related projects and services including the preparation of emission estimate calculations, air permitting, RACT evaluations, and design/evaluation of air pollution abatement/control devices.

Have prepared calculations for volatile organic compounds (VOCs) emissions from eight (8) bulk petroleum storage terminals located in New York and Pennsylvania. Have calculated NOx, VOCs, and particulate emission estimates for two bus maintenance facilities.

Completed air permits and have advised in air permit submittals in New York State, Massachusetts, California, and Virginia. Prepared an air permit submittal to operate a remedial treatment system at an Air Force facility located in New York State.

Have assisted in the preparation of a RACT evaluation for a pharmaceutical firm located in New Jersey. The evaluation addressed the utilization of isopropanol as a carrier solvent and bulk disinfectant in facility operations.

1990-1991 Clarkson University. **Research Assistant.** "The Fate and Effects of Photoprocessing Effluents in Conventional Biological Treatment". A research project funded by Eastman Kodak Company. Studied the effects of photoprocessing effluents on the activated sludge process using continuous-flow and fill-and-draw bench-scale reactors.

EDUCATION

B.S., Chemical Engineering, 1990, Clarkson University, Potsdam, New York

M.S., Environmental Engineering, 1992, Clarkson University, Potsdam, New York

M.S. Thesis Title - "The Fate and Effects of Photoprocessing Effluents on the Activated Sludge Process."

PROFESSIONAL AFFILIATIONS

New York Water Pollution Control Federation - Member

PUBLICATIONS AND PRESENTATIONS

"Pilot-Study of Iron Complexed Cyanide Treatment by Alkaline Hydrolysis", presented at the Water Environment Federation Conference, Chicago, IL, 1994 (coauthors J.L. Swanger and M.B. Fox).

"Response of Continuous-Flow Activated Sludge Reactors to Photoprocessing Wastewaters," *Water Research*, May/June 1994 (coauthor S. G. Pavlostathis).

"Aerobic Biodegration Potential of Photoprocessing Wastewaters," published in *Water Environment Research*, May 1993 (coauthor S. G. Pavlostathis).

"Aerobic Treatment of Photoprocessing Effluents," published in the proceedings for the 23rd Mid-Atlantic Industrial Waste Conference, University of Pittsburgh, 1991 (coauthors S. G. Pavlostathis and K. Sridhar).

"Aerobic Treatment of Photoprocessing Effluents," presented at the Environmental Science and Engineering Research Seminar, 1991.

2(b)

Price Quote

Date: May 27, 1997

Canton Drop Fordge

	PRODUCT CODE	PACKAGE	$/GAL	QUANTITY	DELIVERY LOCATION
Rando HD 150	1660	Tote	$2.20/gal		Canton. OH
Vanguard 680*	631	Drums	$3.42/gal		Canton, OH

*Vanguard 680 priced in drums but delivered in totes.

No Drum or Pallet Charges

Terms

NET 60 Days

Thomas G. Hach
Senior Sales Engineer

VANGUARD

Code 620 **Vanguard 460**
Code 631 **Vanguard 680**
Code 624 **Vanguard 1000**

Vanguard oils are premium steam cylinder oils and worm gear lubricants.

Product Application

Vanguard oils are recommended for lubrication of steam cylinders under dry or wet conditions and where exhaust steam is used. They are also suitable for lubricating worm gear drives, low speed heavily-loaded gears, and low-speed and high temperature bearings. **Vanguard** oils possess excellent lubricity and wetability characteristics along with high VI, foam resistance and rust protection properties. These oils are compounded lubricants containing a stable fatty additive. In addition to possessing the ease of atomization and wetability required for effective steam engine lubrication, they separate readily from steam condensate.

Product Description and Features

Vanguard oils are available in three viscosity grades: ISO 460, 680 and 1000. They are compounded with a refined grade of acidless tallow which allows them to separate easily from condensate and provide good heat resistance. These oils tend to form emulsions when exposed to water and/or steam; however, they will separate water more readily than products containing many other types of fatty materials. **Vanguard** oils are particularly suited for use with higher pressure and lower water content steam. Other features of Vanguard oils are good atomizing properties and the ability to cling to cylinder parts.

Benefits

In service **Vanguard** provides:

- Excellent lubrication of steam cylinders
- Protection where steam condensate presents a problem
- Excellent film strength to protect worm gears
- Protects yellow metals

Product Recommendations and Approvals

Vanguard oils are recommended for use as steam cylinder lubricants and worm gear lubricants. The **Vanguard** series fully meets the requirements of AGMA Standard 250.04 Specification "Lubrication of Industrial Enclosed Gear Drives".

(Issued 4-95)

Product Maintenance

Following the maintenance practices as specified by the OEM's will help maximize equipment life. The service life of **Vanguard** oils are dependent on many variables. Serious contamination from external sources such as solid particles, water (in the case of enclosed gear lubrication) or other fluids call for immediate corrective action. As is always the case, it is important to follow the manufacturers' recommendations regarding equipment and lubricant maintenance.

Typical Characteristics

Vanguard		460	680	1000
Code No.		620	631	624
Appearance		Dark Red		
AGMA No.		7	8	8A
	Test Method			
Gravity, API	D 287	24.9	23.0	21.7
Flash, COC, °F	D 92	455	545	500
Pour Point, °F	D 97	+10	+20	40
Viscosity				
cSt at 40°C	D 445	456	659	930
cSt at 100°C	D 445	30.4	36.5	47.9
SUS at 100°F	(calc)	2438	3569	5060
SUS at 210°F	(calc)	147	178	233
Viscosity Index	D 2270	96	90	96
Carbon Residue, wt%	D 189	0.80	1.3	0.94
Fatty Oil, wt%	D 94	4.5	5.6	5.7

Handling Practices

For information on the safe handling and use of these products, refer to their Material Safety Data Sheets. For more information and availability, call 1+800-STAR-TLC.

TEXACO
MATERIAL SAFETY DATA SHEET

NOTE: Read and understand Material Safety Data Sheet before handling or disposing of product.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATERIAL IDENTITY

Product Code and Name:
00631 VANGUARD 680

Chemical Name and/or Family or Description:
Cylinder & Valve Oils

Manufacturer's Name and Address:
TEXACO LUBRICANTS COMPANY
A DIVISION OF TEXACO REFINING AND MARKETING INC.
P.O. Box 4427
Houston, TX 77210-4427

Telephone Numbers:

Transportation Emergency	-Company	: (914) 831-3400
	CHEMTREC	: (800) 424-9300
Health Emergency	-Company	: (914) 831-3400
General MSDS Assistance		: (914) 838-7204
Technical Information	-Fuels	: (914) 838-7336
	-Chemical	: (512) 459-6543
	-Lubricant/Antifreezes	: (800) 782-7852
	-Additives	: (713) 235-6278
	-Solvents	: (800) 876-3736

2. COMPOSITION/INFORMATION ON INGREDIENTS

THE CRITERIA FOR LISTING COMPONENTS IN THE COMPOSITION SECTION IS AS FOLLOWS: CARCINOGENS ARE LISTED WHEN PRESENT AT 0.1 % OR GREATER; COMPONENTS WHICH ARE OTHERWISE HAZARDOUS ACCORDING TO OSHA ARE LISTED WHEN PRESENT AT 1.0 % OR GREATER; NON-HAZARDOUS COMPONENTS ARE LISTED AT 3.0 % OR GREATER. THIS IS NOT INTENDED TO BE A COMPLETE COMPOSITIONAL DISCLOSURE. REFER TO SECTION 14 FOR APPLICABLE STATES' RIGHT TO KNOW AND OTHER REGULATORY INFORMATION.

Product and/or Component(s) Carcinogenic According to:

OSHA	IARC	NTP	OTHER	NONE
–	–	–	–	X

Composition: (Sequence Number and Chemical Name)

Seq.	Chemical Name	CAS Number	Range in %
01	# Solvent deasphalted residual petroleum oil	64741-95-3	65.00-79.99
02	# Solvent-dewaxed heavy paraffinic petroleum distillates	64742-65-0	20.00-34.99
03	* Acidless tallow oil	61789-97-7	3.00-9.99

PRODUCT IS NON-HAZARDOUS ACCORDING TO OSHA (1910.1200).
* COMPONENT IS HAZARDOUS ACCORDING TO OSHA.
# COMPONENT, BY DEFINITION, IS CONSIDERED HAZARDOUS ACCORDING TO OSHA BECAUSE IT CARRIES THE PERMISSIBLE EXPOSURE LIMIT (PEL) FOR MINERAL OIL MIST.

Exposure Limits referenced by Sequence Number in the Composition Section

Seq.	Limit	
01	5	mg/m3 TWA-OSHA (MINERAL OIL MIST)
01	5	mg/m3 TWA-ACGIH (MINERAL OIL MIST)
01	10	mg/m3 STEL ACGIH (MINERAL OIL MIST)
02	5	mg/m3 TWA-OSHA (MINERAL OIL MIST)
02	5	mg/m3 TWA-ACGIH (MINERAL OIL MIST)
02	10	mg/m3 STEL ACGIH (MINERAL OIL MIST)

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Appearance:
Dark red liquid
Odor:
Not determined

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
< - LESS THAN > - GREATER THAN

3. HAZARD IDENTIFICATION (CONT)

WARNING STATEMENT
NONE CONSIDERED NECESSARY

HMIS			NFPA		
Health:	0	Reactivity: 0	Health:	0	Reactivity: 0
Flammability:	1	Special : -	Flammability:	1	Special : -

POTENTIAL HEALTH EFFECTS

	EYE	SKIN	INHALATION	INGESTION
Primary Route of Exposure:	X	X	X	_

EFFECTS OF OVEREXPOSURE

Acute:

Eyes:
May cause minimal irritation, experienced as temporary discomfort.

Skin:
Brief contact is not irritating. Prolonged contact, as with clothing wetted with material, may cause defatting of skin or irritation, seen as local redness with possible mild discomfort.

Other than the potential skin irritation effects noted above, acute (short term) adverse effects are not expected from brief skin contact; see other effects, below, and Section 11 for information regarding potential long term effects.

Inhalation:
Vapors or mist, in excess of permissible concentrations, or in unusually high concentrations generated from spraying, heating the material or as from exposure in poorly ventilated areas or confined spaces, may cause irritation of the nose and throat, headache, nausea, and drowsiness.

Ingestion:
If more than several mouthfuls are swallowed, abdominal discomfort, nausea, and diarrhea may occur.

Sensitization Properties:
Unknown.

Chronic:
No adverse effects have been documented in humans as a result of chronic exposure. Section 11 may contain applicable animal data.

Medical Conditions Aggravated by Exposure:
Because of its defatting properties, prolonged and repeated skin contact may aggravate an existing dermatitis (skin condition).

Other Remarks:
None

4. FIRST AID MEASURES

Eyes:
Flush eyes with plenty of water for several minutes. Get medical attention if eye irritation persists.

Skin:
Wash skin with plenty of soap and water for several minutes. Get medical attention if skin irritation develops or persists.

Ingestion:
If more than several mouthfuls of this material are swallowed, give two glasses of water (16 oz.). Get medical attention.

Inhalation:
If irritation, headache, nausea, or drowsiness occurs, remove to fresh air. Get medical attention if breathing becomes difficult or respiratory irritation persists.

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
< - LESS THAN > - GREATER THAN

4. FIRST AID MEASURES (CONT)

Other Instructions:
Remove and dry-clean or launder clothing soaked or soiled with this material before reuse. Dry cleaning of contaminated clothing may be more effective than normal laundering. Inform individuals responsible for cleaning of potential hazards associated with handling contaminated clothing.

5. FIRE-FIGHTING MEASURES

Ignition Temperature - AIT (degrees F):
Not determined.

Flash Point (degrees F):
530 (COC)

Flammable Limits (%):
Lower: Not determined.
Upper: Not determined.

Recommended Fire Extinguishing Agents And Special Procedures:
Use water spray, dry chemical, foam, or carbon dioxide to extinguish flames. Use water spray to cool fire-exposed containers. Water or foam may cause frothing.

Unusual or Explosive Hazards:
None

Special Protective Equipment for Firefighters:
No special equipment or procedures required.

6. ACCIDENTAL RELEASE MEASURES (Transportation Spills: CHEMTREC (800)424-9300)

Procedures in Case of Accidental Release, Breakage or Leakage:
Ventilate area. Avoid breathing vapor. Wear appropriate personal protective equipment, including appropriate respiratory protection. Contain spill if possible. Wipe up or absorb on suitable material and shovel up. Prevent entry into sewers and waterways. Avoid contact with skin, eyes or clothing.

7. HANDLING AND STORAGE

Precautions to be Taken in Handling:
Minimum feasible handling temperatures should be maintained.

Storage:
Periods of exposure to high temperatures should be minimized. Water contamination should be avoided.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective Equipment (Type)

Eye/Face Protection:
Safety glasses, chemical type goggles, or face shield recommended to prevent eye contact.

Skin Protection:
Workers should wash exposed skin several times daily with soap and water. Soiled work clothing should be laundered or dry-cleaned.

Respiratory Protection:
Airborne concentrations should be kept to lowest levels possible. If vapor, mist or dust is generated and the occupational exposure limit of the product, or any component of the product, is exceeded, use appropriate NIOSH or MSHA approved air purifying or air supplied respirator after determining the airborne concentration of the contaminant. Air supplied respirators should always be worn when airborne concentration of the contaminant or oxygen content is unknown.

Ventilation:
Adequate to meet component occupational exposure limits (see Section 2).

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
< - LESS THAN > - GREATER THAN

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (CONT)

Exposure Limit for Total Product:
None established for product; refer to Section 2 for component exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:
Dark red liquid

Odor:
Not determined

Boiling Point (degrees F):
Not determined.

Melting/Freezing point (degrees F):
Not applicable.

Specific Gravity (water=1):
.9188

pH of undiluted product:
Not applicable.

Vapor Pressure:
Not determined.

Viscosity:
670 cSt at 40.0 C

VOC Content:
Not determined.

Vapor Density (air=1):
Not determined.

Solubility in Water (%):
Not determined.

Other: None

10. STABILITY AND REACTIVITY

This Material Reacts Violently With:
(If Others is checked below, see comments for details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
-	-	-	X	-	-

Comments:
None

Products Evolved When Subjected to Heat or Combustion:
Toxic levels of carbon monoxide, carbon dioxide, irritating aldehydes and ketones.

Hazardous Polymerizations: DO NOT OCCUR

11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION(ANIMAL TOXICITY DATA)

Median Lethal Dose

Oral:
LD50 Believed to be > 5.00 g/kg (rat) practically non-toxic

Inhalation:
Not determined.

Dermal:
LD50 Believed to be > 2.00 g/kg (rabbit) practically non-toxic

Irritation Index, Estimation of Irritation (Species)

Skin:
(Draize) Believed to be < .50 /8.0 (rabbit) no appreciable effect

Eyes:
(Draize) Believed to be < 15.00 /110 (rabbit) no appreciable effect

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
< - LESS THAN > - GREATER THAN

11. TOXICOLOGICAL INFORMATION (CONT)

Sensitization:
Not determined.

Other:
None

12. DISPOSAL CONSIDERATIONS

Waste Disposal Methods
This product has been evaluated for RCRA characteristics and does not meet the criteria of a hazardous waste if discarded in its purchased form. Under RCRA, it is the responsibility of the user of the product to determine at the time of disposal, whether the product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixtures, processes, etc. may render the resulting materials hazardous.

Remarks
None

13. TRANSPORT INFORMATION

Transportation

DOT:
Proper Shipping Name:
Not regulated

IMDG:
Proper Shipping Name:
Not evaluated

ICAO:
Proper Shipping Name:
Not evaluated

TDG:
Proper Shipping Name:
Not evaluated

14. REGULATORY INFORMATION

Federal Regulations:

SARA Title III:

Section 302/304 Extremely Hazardous Substances

Seq.	Chemical Name	CAS Number	Range in %
None			

Section 302/304 Extremely Hazardous Substances (CONT)

Seq.	TPQ	RQ
None		

Section 311 Hazardous Categorization:

Acute	Chronic	Fire	Pressure	Reactive	N/A
-	-	-	-	-	X

Section 313 Toxic Chemical

Chemical Name	CAS Number	Concentration
None		

CERCLA 102(a)/DOT Hazardous Substances: (+ indicates DOT Hazardous Substance)

Seq	Chemical Name	CAS Number	Range in %
None			

CERCLA/DOT Hazardous Substances (Sequence Numbers and RQ's):

Seq.	RQ
None	

TSCA Inventory Status:
This product, or its components, are listed on or are exempt from the Toxic Substance Control Act (TSCA) Chemical Substance Inventory.

Other:
None.

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
< - LESS THAN > - GREATER THAN

14. REGULATORY INFORMATION (CONT)

State Regulations:

California Proposition 65:

The following detectable components of this product are substances, or belong to classes of substances, known to the State of California to cause cancer and/or reproductive toxicity.

Chemical Name	CAS Number
None	

States Right-to-know Regulations:

Chemical Name	State Right-to-know
None	

State list: CT (Connecticut), FL (Florida), IL (Illinois), MI (Michigan), LA (Louisiana), MA (Massachusetts), NJ (New Jersey), PA (Pennsylvania), RI (Rhode Island)

International Regulations:

WHMIS Classification:
Not regulated

Canada Inventory Status:
This product, or its components, are listed on or are exempt from the Canadian Domestic Substance List (DSL).

EINECS Inventory Status:
Not determined.

Australia Inventory Status:
Not determined.

Japan Inventory Status:
Not determined.

15. ENVIRONMENTAL INFORMATION

Aquatic Toxicity:
Not determined.

Mobility:
Not determined.

Persistence and Biodegradability:
Not determined.

Potential to Bioaccumulate:
Not evaluated.

Remarks:
Not evaluated.

16. OTHER INFORMATION

None

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE. IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT FOR PURPOSE OF HAZARD COMMUNICATION AS PART OF TEXACO'S PRODUCT SAFETY PROGRAM. IT IS NOT INTENDED TO CONSTITUTE PERFORMANCE INFORMATION CONCERNING THE PRODUCT. NO EXPRESS WARRANTY, OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE WITH RESPECT TO THE PRODUCT OR THE INFORMATION CONTAINED HEREIN. DATA SHEETS ARE AVAILABLE FOR ALL TEXACO PRODUCTS. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL TEXACO PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE AND YOU ARE ENCOURAGED AND REQUESTED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

TO DETERMINE APPLICABILITY OR EFFECT OF ANY LAW OR REGULATION WITH RESPECT TO THE PRODUCT, USER SHOULD CONSULT HIS LEGAL ADVISOR OR THE APPROPRIATE GOVERNMENT AGENCY. TEXACO DOES NOT UNDERTAKE TO FURNISH ADVICE ON SUCH

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE N.T. - NOT TESTED
< - LESS THAN > - GREATER THAN

17. PRODUCT LABEL (CONT)

Label Date: 05-02-96

Manufacturer's Name and Address:
TEXACO LUBRICANTS COMPANY
A DIVISION OF TEXACO REFINING AND MARKETING INC.
P.O. Box 4427
Houston, TX 77210-4427

TRANSPORTATION EMERGENCY	Company:	(914) 831-3400
	CHEMTREC:	(800) 424-9300
HEALTH EMERGENCY	Company:	(914) 831-3400

MAIL BOXES ETC.®

260

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- Call-in MailCheck™ Service
- UPS® Authorized Shipping Outlet
- Ground, 2nd Day Air, Next Day Air Shipping via UPS and Other Carriers
- Packing, Shipping and Supplies
- Copies with 24-hr. Access Available
- MinuteMail®/Fax Network
- Stamps and Metered Mail
- Office Supplies
- Notary
- Business Cards and Stationery
- Rubber Stamps/Name Badges
- Telephone Messaging/Voicemail
- Passport Photos
- Etc., Etc., Etc.

* - Services Available at Most Locations.

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Boardman, Ohio 44512

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(330) 726-7667
(330) 726-7906 FAX

☐ Urgent
☐ Confidential

Date: 5/22/97 Time: 4:20

To: Keith Houseknecht

Fax No.: (330) 477-2046

From: Rob Faulk - Diversey

Phone No.: 800 560-6630

# of Pages (including this sheet): 2

Message: Here is a copy of the 0+G analysis on the HPS. The 1st one was before the anthracite filters. I could leave you some sample jars on-site to sample when you felt high amounts of O.I were getting through Let me know if you would like to do that.

Diversey Water Technologies Inc
7145 Pine Street
P.O. Box 200
Chagrin Falls, OH 44022
Tel: (216) 247-5000
Fax: (216) 247-0745

WATER ANALYSIS REPORT

SAMPLE #: 16810 16811

CUSTOMER #/NAME: 1420000 CANTON DROP FORGING & MFG
CITY/STATE/ZIP: CANTON OH 44706
ATTENTION: ROBERT FAULK
SALES REP: FAULK, ROBERT
DISTRICT: OHIO VALLEY DISTRICT

SAMPLE INFORMATION

	16810	16811
SAMPLE #:	16810	16811
SAMPLE DATE:	5/07/97	5/07/97
LOG-IN DATE:	5/09/97	5/09/97
REPORT DATE:	5/12/97	5/12/97
SAMPLE TIME:	04:30 PM	04:30 PM
PRODUCTS USED:	N/A	N/A
SAMPLE FROM:	HPS	HPS & FILTERED

PARAMETERS	16810 RESULTS	16811 RESULTS
Oil & Grease (SM 5520B) mg/L	1	1

REVIEWED BY Mary Woodard APPROVED

THIS ANALYSIS HAS A VALUE OF $30.00 $30.00

97

Ohio EPA Certificate #1291 for inorganics & #849 for total coliform

* Prepared by Diversey Water Technologies Inc.

Quanterra Incorporated
4101 Shuffel Drive, NW
North Canton, Ohio 44720

330 497-9396 Telephone
330 497-0772 Fax

Quanterra
Environmental
Services

2(b)

ANALYTICAL REPORT

CANTON DROP FORGE WASTEWATER

Lot #: A7E140153

Michael R. Leffler

Parsons Engineering Science, Inc.

QUANTERRA INCORPORATED

Rebecca Strait
Rebecca L. Strait
Project Manager

May 29, 1997

EXECUTIVE SUMMARY - Detection Highlights

A7E140153

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
01 CONDENSATE TANK 05/13/97 13:30 001				
Oil and Grease (Gravimetric)	258	5.0	mg/L	MCAWW 413.1
02 POND 3 INFL 05/13/97 14:45 002				
Oil and Grease (Gravimetric)	8.3	5.0	mg/L	MCAWW 413.1
03 HPS SEPARATOR 05/13/97 14:15 003				
Oil and Grease (Gravimetric)	1220	5.0	mg/L	MCAWW 413.1
04 BOILER FEED WATER 05/13/97 13:40 004				
Oil and Grease (Gravimetric)	5.4	5.0	mg/L	MCAWW 413.1
H1A HPS BLOWDOWN 05/13/97 14:00 005				
Calcium	165	5.0	mg/L	MCAWW 200.7
Magnesium	16.8	5.0	mg/L	MCAWW 200.7
Hardness, as CaCO3	480	4	mg/L	MCAWW 130.2
H1B HPS BLOWDOWN 05/13/97 14:00 006				
pH (liquid)	10.0		No Units	MCAWW 150.1
Total Dissolved Solids	310	10	mg/L	MCAWW 160.1
Total Alkalinity	2090	25.0	mg/L	SM18 2320 B
H2A BOILER FEED WATER 05/13/97 13:50 007				
Hardness, as CaCO3	8	2	mg/L	MCAWW 130.2
H2B BOILER FEED WATER 05/13/97 13:50 008				
pH (liquid)	9.7		No Units	MCAWW 150.1
Total Dissolved Solids	160	10	mg/L	MCAWW 160.1
Total Alkalinity	55.2	5.0	mg/L	SM18 2320 B

INLET? NO SURFACE WATER?

CASE NARRATIVE

The following report contains the analytical results for eight water samples submitted to Quanterra-North Canton by Parsons Engineering Science, Inc. from the Canton Drop Forge Wastewater Site. The samples were received May 14, 1997, according to documented sample acceptance procedures.

Quanterra utilizes only USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the following page in accordance with the methods indicated.

The results included in this report have been reviewed for compliance with the laboratory QA/QC plan. All data have been found to be compliant with laboratory protocol.

Supplemental QC Information

GENERAL CHEMISTRY

Matrix spike/matrix spike duplicate spike recovery was outside the acceptance limits for total alkalinity on QC batch 7140229. However, the acceptable LCS analysis data indicated that the analytical system was operating within control and this condition is most likely due to matrix interference.

There are samples reported with dilutions due to either high target analytes or matrix interference.

ANALYTICAL METHODS SUMMARY

A7E140153

PARAMETER	ANALYTICAL METHOD
pH (Electrometric)	MCAWW 150.1
Alkalinity, Total	SM18 2320 B
Filterable Residue (TDS)	MCAWW 160.1
Inductively Coupled Plasma (ICP) Metals	MCAWW 200.7
Oil & Grease (Gravimetric)	MCAWW 413.1
Total Hardness (Titrimetric, EDTA)	MCAWW 130.2

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SM18 "Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992.

SAMPLE SUMMARY

A7E140153

WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
C9KH9	001	01 CONDENSATE TANK	05/13/97	13:30
C9KHD	002	02 POND 3 INFL	05/13/97	14:45
C9KHE	003	03 HPS SEPARATOR	05/13/97	14:15
C9KHF	004	04 BOILER FEED WATER	05/13/97	13:40
C9KHG	005	H1A HPS BLOWDOWN	05/13/97	14:00
C9KHK	006	H1B HPS BLOWDOWN	05/13/97	14:00
C9KHL	007	H2A BOILER FEED WATER	05/13/97	13:50
C9KHM	008	H2B BOILER FEED WATER	05/13/97	13:50

NOTE(S) :

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: 01 CONDENSATE TANK

General Chemistry

Lot-Sample #...: A7E140153-001 **Work Order #...:** C9KH9 **Matrix.....:** WATER
Date Sampled...: 05/13/97 13:30 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Oil and Grease (Gravimetric)	**258**	**5.0**	**mg/L**	**MCAWW 413.1**	**05/22/97**	**7147187**

Dilution Factor: 1

PARSONS ENGINEERRING SCIENCE, INC.

Client Sample ID: 02 POND 3 INFL

General Chemistry

Lot-Sample #...: A7E140153-002 **Work Order #...:** C9KHD **Matrix.....:** WATER
Date Sampled...: 05/13/97 14:45 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Oil and Grease (Gravimetric)	8.3	5.0	mg/L	MCAWW 413.1	05/22/97	7147187

Dilution Factor: 1

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: 03 HPS SEPARATOR

General Chemistry

Lot-Sample #...: A7E140153-003 **Work Order #...:** C9KHE **Matrix.....:** WATER
Date Sampled...: 05/13/97 14:15 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Oil and Grease (Gravimetric)	**1220**	**5.0**	**mg/L**	**MCAWW 413.1**	**05/22/97**	**7147187**

Dilution Factor: 1

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: 04 BOILER FEED WATER

General Chemistry

Lot-Sample #...: A7E140153-004 **Work Order #...:** C9KHF **Matrix.....:** WATER
Date Sampled...: 05/13/97 13:40 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Oil and Grease (Gravimetric)	5.4	5.0	mg/L	MCAWW 413.1	05/22/97	7147187

Dilution Factor: 1

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: H1A HPS BLOWDOWN

TOTAL Metals

Lot-Sample #...: A7E140153-005 **Matrix.....:** WATER
Date Sampled...: 05/13/97 14:00 **Date Received..:** 05/14/97

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7135127						
Calcium	**165**	**5.0**	**mg/L**	**MCAWW 200.7**	**05/15-05/16/97**	**C9KHG102**
		Dilution Factor: 1				
Magnesium	**16.8**	**5.0**	**mg/L**	**MCAWW 200.7**	**05/15-05/16/97**	**C9KHG103**
		Dilution Factor: 1				

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: H1A HPS BLOWDOWN

General Chemistry

Lot-Sample #...: A7E140153-005 **Work Order #...:** C9KHG **Matrix.....:** WATER
Date Sampled...: 05/13/97 14:00 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3	**480**	**4**	**mg/L**	**MCAWW 130.2**	**05/27/97**	**7147243**

Dilution Factor: 2

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: H1B HPS BLOWDOWN

General Chemistry

Lot-Sample #...: A7E140153-006 **Work Order #...:** C9KHK **Matrix.....:** WATER
Date Sampled...: 05/13/97 14:00 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH (liquid)	10.0		No Units	MCAWW 150.1	05/14/97	7134257
	Dilution Factor: 1					
Total Alkalinity	2090	25.0	mg/L	SM18 2320 B	05/20/97	7140229
	Dilution Factor: 5					
Total Dissolved Solids	310	10	mg/L	MCAWW 160.1	05/19/97	7140268
	Dilution Factor: 1					

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: H2A BOILER FEED WATER

TOTAL Metals

Lot-Sample #...: A7E140153-007 **Matrix.....:** WATER
Date Sampled...: 05/13/97 13:50 **Date Received..:** 05/14/97

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7135127						
Calcium	ND	5.0 Dilution Factor: 1	mg/L	MCAWW 200.7	05/15-05/16/97	C9KHL102
Magnesium	ND	5.0 Dilution Factor: 1	mg/L	MCAWW 200.7	05/15-05/16/97	C9KHL103

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: H2A BOILER FEED WATER

General Chemistry

Lot-Sample #...: A7E140153-007 **Work Order #...:** C9KHL **Matrix.....:** WATER
Date Sampled...: 05/13/97 13:50 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3	**8**	**2**	**mg/L**	**MCAWW 130.2**	**05/27/97**	**7147243**

Dilution Factor: 1

PARSONS ENGINEERING SCIENCE, INC.

Client Sample ID: H2B BOILER FEED WATER

General Chemistry

Lot-Sample #...: A7E140153-008 **Work Order #...:** C9KHM **Matrix.....:** WATER
Date Sampled...: 05/13/97 13:50 **Date Received..:** 05/14/97

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH (liquid)	9.7		No Units	MCAWW 150.1	05/14/97	7134257
	Dilution Factor: 1					
Total Alkalinity	55.2	5.0	mg/L	SM18 2320 B	05/20/97	7140229
	Dilution Factor: 1					
Total Dissolved Solids	160	10	mg/L	MCAWW 160.1	05/19/97	7140268
	Dilution Factor: 1					

QUALITY CONTROL SECTION

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: A7E140153 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: A7E150000-127 **Prep Batch #...:** 7135127					
Magnesium	97	(80 - 120)	MCAWW 200.7	05/15-05/16/97	C9KP212A
		Dilution Factor: 1			
Calcium	92	(80 - 120)	MCAWW 200.7	05/15-05/16/97	C9KP2129
		Dilution Factor: 1			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: A7E140153 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Oil and Grease (Gravimetric)	WO#:C9RG8102-LCS/C9RG8103-LCSD LCS Lot-Sample#: A7E270000-187						
	108	(75 - 125)			MCAWW 413.1	05/22/97	7147187
	108	(75 - 125)	0.46	(0-20)	MCAWW 413.1	05/22/97	7147187
	Dilution Factor: 1						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3		Work Order #: C9RLG102	LCS Lot-Sample#: A7E270000-243		
	101	(80 - 120)	MCAWW 130.2	05/27/97	7147243
		Dilution Factor: 1			
Oil and Grease (Gravimetric)		Work Order #: C9RG8102	LCS Lot-Sample#: A7E270000-187		
	108	(75 - 125)	MCAWW 413.1	05/22/97	7147187
		Dilution Factor: 1			
Total Alkalinity		Work Order #: C9ND9102	LCS Lot-Sample#: A7E200000-229		
	110	(80 - 120)	SM18 2320 B	05/20/97	7140229
		Dilution Factor: 1			
Total Dissolved Solids		Work Order #: C9NH5102	LCS Lot-Sample#: A7E200000-268		
	82	(80 - 120)	MCAWW 160.1	05/19/97	7140268
		Dilution Factor: 1			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: A7E140153 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: A7E150000-127 **Prep Batch #...:** 7135127						
Calcium	ND	5.0	mg/L	MCAWW 200.7	05/15-05/16/97	C9KP211L
		Dilution Factor: 1				
Magnesium	ND	5.0	mg/L	MCAWW 200.7	05/15-05/16/97	C9KP211M
		Dilution Factor: 1				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

General Chemistry

Client Lot #...: A7E140153 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3		Work Order #: C9RLG101		MB Lot-Sample #: A7E270000-243		
	ND	2	mg/L	MCAWW 130.2	05/27/97	7147243
		Dilution Factor: 1				
Oil and Grease (Gravimetric)		Work Order #: C9RG8101		MB Lot-Sample #: A7E270000-187		
	ND	5.0	mg/L	MCAWW 413.1	05/22/97	7147187
		Dilution Factor: 1				
Total Alkalinity		Work Order #: C9ND9101		MB Lot-Sample #: A7E200000-229		
	ND	5.0	mg/L	SM18 2320 B	05/20/97	7140229
		Dilution Factor: 1				
Total Dissolved Solids		Work Order #: C9NH5101		MB Lot-Sample #: A7E200000-268		
	ND	10	mg/L	MCAWW 160.1	05/19/97	7140268
		Dilution Factor: 1				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: A7E140153 **Matrix.....:** WATER
Date Sampled...: 05/07/97 16:00 **Date Received..:** 05/08/97

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: A7E080127-001 **Prep Batch #...:** 7135127							
Calcium	93	(80 - 120)			MCAWW 200.7	05/15-05/16/97	C9G3813J
	85	(80 - 120)	7.1	(0-20)	MCAWW 200.7	05/15-05/16/97	C9G3813K
		Dilution Factor: 1					
Magnesium	96	(80 - 120)			MCAWW 200.7	05/15-05/16/97	C9G3813M
	89	(80 - 120)	7.1	(0-20)	MCAWW 200.7	05/15-05/16/97	C9G3813N
		Dilution Factor: 1					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Matrix.....:** WATER
Date Sampled...: 05/13/97 11:25 **Date Received..:** 05/15/97

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3		WO#: C9KHL104-MS/C9KHL105-MSD				MS Lot-Sample #: A7E140153-007	
	99	(80 - 120)			MCAWW 130.2	05/27/97	7147243
	99	(80 - 120)	0.0	(0-20)	MCAWW 130.2	05/27/97	7147243
		Dilution Factor: 1					
Total Alkalinity		WO#: C9JXW117-MS/C9JXW118-MSD				MS Lot-Sample #: A7E140101-001	
	34 N	(80 - 120)			SM18 2320 B	05/20/97	7140229
	34 N	(80 - 120)	0.42	(0-20)	SM18 2320 B	05/20/97	7140229
		Dilution Factor: 1					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9KLG-SMP C9KLG-DUP **Matrix.....:** WATER

Date Sampled...: 05/13/97 12:55 **Date Received..:** 05/14/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH (liquid)						SD Lot-Sample #: A7E140166-001		
	7.4	7.4	No Units	0.13	(0-20)	MCAWW 150.1	05/14/97	7134257

Dilution Factor: 1

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9KLK-SMP C9KLK-DUP **Matrix.....:** WATER

Date Sampled...: 05/13/97 14:10 **Date Received..:** 05/14/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH (liquid)						SD Lot-Sample #: A7E140166-002		
	7.3	7.3	No Units	0.14	(0-20)	MCAWW 150.1	05/14/97	7134257

Dilution Factor: 1

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9KLG-SMP C9KLG-DUP **Matrix.....:** WATER

Date Sampled...: 05/13/97 12:55 **Date Received..:** 05/14/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH (liquid)						SD Lot-Sample #: A7E140166-001		
	7.4	7.4	No Units	0.13	(0-20)	MCAWW 150.1	05/14/97	7134257

Dilution Factor: 1

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9KLK-SMP C9KLK-DUP **Matrix.....:** WATER

Date Sampled...: 05/13/97 14:10 **Date Received..:** 05/14/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH (liquid)						SD Lot-Sample #: A7E140166-002		
	7.3	7.3	No Units	0.14	(0-20)	MCAWW 150.1	05/14/97	7134257

Dilution Factor: 1

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9K0D-SMP C9K0D-DUP **Matrix.....:** WATER

Date Sampled...: 05/13/97 12:50 **Date Received..:** 05/13/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Dissolved Solids						SD Lot-Sample #: A7E140101-003		
	1400	1400	mg/L	1.9	(0-20)	MCAWW 160.1	05/19/97	7140268
		Dilution Factor: 1						

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9L0F-SMP C9L0F-DUP **Matrix.....:** WATER

Date Sampled...: 05/13/97 11:25 **Date Received..:** 05/15/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Dissolved Solids						SD Lot-Sample #: A7E140166-003		
	280	280	mg/L	2.5	(0-20)	MCAWW 160.1	05/19/97	7140268
		Dilution Factor: 1						

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: A7E140153 **Work Order #...:** C9F7R-SMP C9F7R-DUP **Matrix.....:** WATER

Date Sampled...: 05/01/97 08:15 **Date Received..:** 05/07/97

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3						SD Lot-Sample #: A7E070109-001		
	ND	ND	mg/L	0	(0-20)	MCAWW 130.2	05/27/97	7147243
		Dilution Factor: 1						

Chain of Custody Record

Quanterra

QUA-4124-A

Client	Project Manager	Date	Chain Of Custody Number
Parsons Engineering Science	Michael R LEFFLER	5/13/97	28858
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of**
19101 Villa Rica Road	(216) 486-9005 / (216) 486-6119		
City / **State** / **Zip Code**	**Site Contact**		
Cleveland / OH / 44119			
Project Name	**Carrier/Waybill Number**		
Canton Drop Forge, WASTEWATER RECYCLE ~~OIL/GREASE~~			
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: Oil/Grease, Gravimetric	Calcium	Total Hardness	Alkalinity	TDS	pH *	Magnesium *
01 CONDENSATE TANK	5/13/97	1:30pm	Water	1L	Glass	1	H_2SO_4		X						
02 Pond 3 INFL	5/13/97	2:45pm	Water	1L	Glass	1	H_2SO_4		X						
03 HPS Separator	5/13/97	2:15pm	Water	1L	Glass	1	H_2SO_4		X						
04 Boiler Feed Water	5/13/97	1:40pm	Water	1L	Glass	1	H_2SO_4		X						
H1A HPS Blowdown	5/13/97	2:00pm	Water	500ml	P	1	HNO_3			X	X				X
H1B HPS Blowdown	5/13/97	2:00pm	Water	500ml	P	1	~~HNO_3~~ NONE MGL					X	X	X	
H2A Boiler Feed Water	5/13/97	1:50pm	Water	500ml	500ml P	1	HNO_3			X	X				X
H2B Boiler Feed Water	5/13/97	1:50pm	Water	500ml	P	1	NONE					X	X	X	

CDF002414

Special Instructions

Possible Hazard Identification

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

~~☒~~ MGL Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required

☒ Normal ☐ Rush

QC Level ☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	M R Leffler	5/13/97	17:25		5/13/97	17:25
2.						
3.					5/14/97	10^10 A

Comments

* pH and Magnesium were not included in original discussion -- omit if sample is insufficient or improper

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

1(d), 1(e)

INVOICE

Hudson Industries

Box 2212 • Hudson, Ohio 44236-0812 • 216-487-0668 • FAX 216-487-0811

DATE	INV NO.
5/21/97	9722 A

BILL TO	SHIP TO
Canton Drop Forge **4575 Southway Street, S.W.** **Canton, OH 44706**	**Canton Drop Forge** **4575 Southway Street, S.W.** **Canton, OH 44706** **Attn: Stockroom**

P.O. NO.	TERMS	SHIP DATE	SHIP VIA	FOB	REP
097838	**Net 30**	**5/21/97**	**Best Way**	**Kent, OH**	

DESCRIPTION	QTY	PRICE	AMOUNT
CS-3 Coalescing Oil/Water Separator	**1**	**450.00**	**450.00**
Shipping & Handling	**1**	**50.00**	**50.00**
Rental Unit			
First Month Rental Fee $450.00 &			
$ 50.00 Delivery Fee			

619

Keith: Is This Escrow?

Yes This is Escrow KJH

Unit was delivered to Gate to be ~~sold~~ of value. $450 not approved. KJH 6/9/97

ACCOUNT DISTRIBUTION Reg. No.

Genl. Acct.	Plant	Dept.	Cost Center	Machine No.	Factory Account		Freight Prov.	Invoice Amount
131	ESCROW							500.00
131								
131								

FORM CDF 41 5M GP

Total $500.00

CDF002415

CLEVELAND TECHNICAL CENTER

18419 EUCLID AVENUE, CLEVELAND, OHIO 44112-1016 (800) 726-5400, FAX (216) 383-9633

DESCRIPTION: CYLINDER OIL

CUSTOMER NO.: 10605 UNIT NO.: 2-CDF

OIL BRAND:

MAKE: MODEL: OIL TYPE:

UNIT SERIAL NO:. FUEL TYPE: NO. COPIES: 1

SAMPLE DATA			SPECTROCHEMICAL ANALYSIS (VALUES EXPRESSED IN PARTS PER MILLION (PPM) BY WEIGHT)																			PHYSICAL PROPERTY DATA							
LAB#	DATE TAKEN/ TESTED	HRS/MI OIL UNIT	IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM	FLASH	FUEL % Vol	VIS 40° C cSt	VIS 100° C cSt	WATER % Vol	SOLIDS % Vol	GLYCOL
145269	05/30/97 06/05/97																							N/A	N/A	N/A	N/A	N/A	N/A	N/A

LAB#	ADDITIONAL CUSTOMER TESTS										PARTICLE COUNT RESULTS
	DEMULS										
145269	***										

LAB#	ANALYSIS RECOMMENDATIONS

LAB#	ANALYSIS RECOMMENDATIONS
145269	DEMULSIBILITY = 40/40/15

40 ml / — ml / — ml IN 15 MINUTES
H20 / OIL / EMULSION
STD

CANTON DROP FORGE
BOX 6902 4575 SOUTHWAY ST S W
CANTON, OH 44706

CDF002416

WHEN CORRECTIVE ACTION IS INDICATED, PLEASE ADVISE RESULTS OF YOUR FINDINGS AND CORRECTIVE ACTION TAKEN ON ENCLOSED FORM.

CLEVELAND TECHNICAL CENTER

18419 EUCLID AVENUE, CLEVELAND, OHIO 44112-1016 (800) 726-5400, FAX (216) 383-9633

DESCRIPTION: CYLINDER OIL

CUSTOMER NO.: 10605 UNIT NO.: 1-CDF

MAKE: MODEL: OIL BRAND:

UNIT SERIAL NO:. FUEL TYPE: OIL TYPE:

NO. COPIES: 1

SAMPLE DATA

LAB#	DATE TAKEN/ TESTED	HRS/MI OIL UNIT
145268	05/30/97	
	06/05/97	

SPECTROCHEMICAL ANALYSIS
VALUES EXPRESSED IN PARTS PER MILLION (PPM) BY WEIGHT

IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM

PHYSICAL PROPERTY DATA

FLASH	FUEL % Vol	VIS 40° C cSt	VIS 100° C cSt	WATER % Vol	SOLIDS % Vol	GLYCOL
N/A	N/A	N/A	N/A	N/A	N/A	N/A

ADDITIONAL CUSTOMER TESTS

LAB#	DEMULS
145268	***

PARTICLE COUNT RESULTS

ANALYSIS RECOMMENDATIONS

LAB#

ANALYSIS RECOMMENDATIONS

LAB#

145268 DEMULSIBILITY = 40/40/15

CDF002417

CANTON DROP FORGE
BOX 6902 4575 SOUTHWAY ST S W
CANTON, OH 44706

WHEN CORRECTIVE ACTION IS INDICATED, PLEASE ADVISE RESULTS OF YOUR FINDINGS AND CORRECTIVE ACTION TAKEN ON ENCLOSED FORM.

CLEVELAND TECHNICAL CENTER

18419 EUCLID AVENUE, CLEVELAND, OHIO 44112-1016 (800) 726-5400, FAX (216) 383-9633

DESCRIPTION: CYLINDER OIL

CUSTOMER NO.: 10605 UNIT NO.: 3-CDF

MAKE: MODEL:

UNIT SERIAL NO:.

OIL BRAND:

OIL TYPE:

FUEL TYPE:

NO. COPIES: 1

SAMPLE DATA

LAB#	DATE TAKEN/ TESTED	HRS/MI OIL UNIT
145270	05/30/97	
	06/05/97	

SPECTROCHEMICAL ANALYSIS

VALUES EXPRESSED IN PARTS PER MILLION (PPM) BY WEIGHT

IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM

PHYSICAL PROPERTY DATA

FLASH	FUEL % Vol	VIS 40° C cSt	VIS 100° C cSt	WATER % Vol	SOLIDS % Vol	GLYCOL
N/A	N/A	N/A	N/A	N/A	N/A	N/A

ADDITIONAL CUSTOMER TESTS

LAB#	DEMULS
145270	***

PARTICLE COUNT RESULTS

ANALYSIS RECOMMENDATIONS

LAB#

ANALYSIS RECOMMENDATIONS

LAB#

145270 DEMULSIBILITY = 40/40/15

CDF002418

CANTON DROP FORGE
BOX 6902 4575 SOUTHWAY ST S W
CANTON, OH 44706

WHEN CORRECTIVE ACTION IS INDICATED, PLEASE ADVISE RESULTS OF YOUR FINDINGS AND CORRECTIVE ACTION TAKEN ON ENCLOSED FORM.

Commercial Ullman
LUBRICANTS CO.

RECEIVED
MAY 28 1997
CANTON DROP FORGE

2(b),

May 27, 1997

#1 - Mobil Extra Hecla
#2 - Citgo 680-7
#3 - Texaco Vanguard 680
Bob Robie 1-800-726-5400

Canton Drop Forge
ATTN: Mr. Keith Houseknecht
Manager, Plant Engineering
4575 Southway Street S.W.
Canton, OH 44706

ASTM Demulsibility Testing

Dear Keith;

Please find enclosed a pint sample of Mobil Extra Hecla Super Cylinder Oil for your use in testing its demulsibility rating vs. the competitive product now in use.

I contacted the lab manager at Cleveland Technical Center to find out for you whether or not the laboratory could run the ASTM Demulsibility Procedure. They are able to complete this test, charging approximately $52.50 per sample. You should allow a couple of weeks for the results to be completed and returned to you.

You can mail the samples to:

Cleveland Technical Center
18419 Euclid Avenue
Cleveland, OH 44112-1016
Phone: 1-800-726-5400

PO #

Pressure & Temperature } Choices

Copy to ED

When you have the results, Keith, I would appreciate any feedback you can give me regarding the results. Should you need any further assistance in this matter, or if there are other areas where we can be of assistance, please give me a call at 1-800-392-7834, voice mail extension 312.

I will continue to monitor Mobil's development of the new synthetic product we discussed and update you when the information is available.

Respectfully submitted;

Neil F. Hasson
Senior Lubrication Engineer

cc:
Ken Ullman

Cleveland Bulk Plant
2846 East 37th Street
Cleveland, Ohio 44115
Fax: (216) 441-7205 • (216) 441-7200

Canton Bulk Plant
2993 Perry Drive, S.W.
Canton, Ohio 44706
Fax: (330) 478-6990 • (330) 478-6999

Columbus Bulk Plant
2854 Johnstown Road
Columbus, Ohio 43219
Fax: (800) 817-8703 • (800) 392-7834

CLEVELAND TECHNICAL CENTER

18419 EUCLID AVENUE, CLEVELAND, OHIO 44112-1016 (800) 726-5400, FAX (216) 383-9633

DESCRIPTION: CYLINDER OIL

CUSTOMER NO.: 10605 UNIT NO.: 1-CDF

OIL BRAND:

MAKE: MODEL: OIL TYPE:

UNIT SERIAL NO:. FUEL TYPE: NO. COPIES: 2

JUN-13-97 FRI 11:51 AM CLEVELAND TECHNICAL CTR. FAX NO. 216 383 9467 P. 01/03

SAMPLE DATA

LAB#	DATE TAKEN/ TESTED	HRS/MI OIL UNIT
145268	05/30/97 06/05/97	

SPECTROCHEMICAL ANALYSIS

IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM

PHYSICAL PROPERTY DATA

FLASH	FUEL % Vol	VIS 40° C cSt	VIS 100° C cSt	WATER % Vol	SOLIDS % Vol	GLYCOL
N/A	N/A	N/A	N/A	N/A	N/A	N/A

ADDITIONAL CUSTOMER TESTS

LAB#	DEMULS
145268	***

PARTICLE COUNT RESULTS

LAB# ANALYSIS RECOMMENDATIONS

LAB# ANALYSIS RECOMMENDATIONS

145268 DEMULSIBILITY = 40/40/0 15min.
RESULTS REPORTED BY PHONE/FAX

****

********** FAX COPY **********

CANTON DROP FORGE
PHONE # (999) 999-9999
FAX # (000) 000-0000

Ph- 330 477-4511
FAX 330 477-2046

WHEN CORRECTIVE ACTION IS INDICATED, PLEASE ADVISE RESULTS OF YOUR FINDINGS AND CORRECTIVE ACTION TAKEN ON ENCLOSED FORM.

CDF002420

CLEVELAND TECHNICAL CENTER

18419 EUCLID AVENUE, CLEVELAND, OHIO 44112-1016 (800) 726-5400, FAX (216) 383-9633

DESCRIPTION: CYLINDER OIL

CUSTOMER NO.: 10605 UNIT NO.: 3-CDF

MAKE: MODEL: OIL BRAND:

UNIT SERIAL NO:. OIL TYPE:

FUEL TYPE: NO. COPIES: 2

SAMPLE DATA			SPECTROMETRIC ANALYSIS																			PHYSICAL PROPERTY DATA						
LAB#	DATE TAKEN/ TESTED	HRS/MI OIL UNIT	IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM	FLASH	FUEL % Vol	VIS 40° C cSt	VIS 100° C cSt	WATER % Vol	SOLIDS % Vol	GLYCOL
145270	05/30/97 06/05/97																							N/A	N/A	N/A	N/A	N/A	N/A	N/A

LAB#	ADDITIONAL CUSTOMER TESTS										PARTICLE COUNT RESULTS
	DEMULS										
145270	***										

LAB#	ANALYSIS RECOMMENDATIONS

LAB#	ANALYSIS RECOMMENDATIONS
145270	DEMULSIBILITY = 40/40/0 15min. ***RESULTS REPORTED BY PHONE/FAX***

****

********** FAX COPY **********

CANTON DROP FORGE

PHONE # (999) 999-9999

FAX # (000) 000-0000

WHEN CORRECTIVE ACTION IS INDICATED, PLEASE ADVISE RESULTS OF YOUR FINDINGS AND CORRECTIVE ACTION TAKEN ON ENCLOSED FORM.

CTC 100 1/96

CDF002421

CLEVELAND TECHNICAL CENTER

18419 EUCLID AVENUE, CLEVELAND, OHIO 44112-1016 (800) 726-5400, FAX (216) 383-9633

DESCRIPTION: CYLINDER OIL

CUSTOMER NO.: 10605 UNIT NO.: 2-CDF

OIL BRAND:

MAKE: MODEL: OIL TYPE:

UNIT SERIAL NO:. FUEL TYPE: NO. COPIES: 2

SAMPLE DATA			SPECTROMETRICAL ANALYSIS																			PHYSICAL PROPERTY DATA							
LAB#	DATE TAKEN/ TESTED	HRS/MI OIL UNIT	IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	MANGANESE	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM	FLASH	% FUEL % Vol	VIS 40° C cSt	VIS 100° C cSt	% WATER % Vol	% SOLIDS % Vol	GLYCOL
145269	05/30/97 06/05/97																							N/A	N/A	N/A	N/A	N/A	N/A	N/A

LAB#	ADDITIONAL CUSTOMER TESTS										PARTICLE COUNT RESULTS
	DEMULS										
145269	***										

LAB#	ANALYSIS RECOMMENDATIONS

LAB#	ANALYSIS RECOMMENDATIONS
145269	DEMULSIBILITY = 40/40/0 15min.
	RESULTS REPORTED BY PHONE/FAX

****

********** FAX COPY **********

CANTON DROP FORGE

PHONE # (999) 999-9999

FAX # (000) 000-0000

WHEN CORRECTIVE ACTION IS INDICATED, PLEASE ADVISE RESULTS OF YOUR FINDINGS AND CORRECTIVE ACTION TAKEN ON ENCLOSED FORM.

98252

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 13

To Keith Housekneckt	From Ed Karbalka
Co. Canton Drop Forge	Co.
Dept.	Phone #
Fax # 330-477-2046	Fax #

2(b), 3, 7, 1(c)

Draft

CANTON DROP FORGE
PROCESS WATER AND WASTEWATER RECYCLING/TREATMENT INVESTIGATION
SUMMARY REPORT

To Jerry 6/7/97

Introduction

Canton Drop Forge generates a number of process water and wastewater streams, primarily derived from boiler water treatment, condensate and cooling water streams. Some of the wastewater is discharged to the sanitary sewer system for treatment at the City of Massillon wastewater treatment plant; the remaining streams are discharged to an on-site pond system which also handles the site storm water drainage. Wastewater streams are discharged to Pond 2, which is equipped with an oil skimmer and which removes floating oils which may reach the pond. The discharge of Pond 2 is pumped to Pond 3. There is no surface discharge from Pond 3.

All water at the facility comes from Canton Drop Forge wells. Water production is not recorded.

The purposes of this investigation are to identify the most appropriate alternatives for treating, recycling, and/or disposing of the process water and wastewater streams generated by Canton Drop Forge and to avoid discharge of oil-contaminated streams to the on-site ponds. Of primary interest is the condensate flow which contains solubilized oils that do not separate readily in a gravity oil/water separator.

Process Water and Wastewater Streams

Condensate

High pressure steam (150 psig) is generated by two gas boilers and one coal-fired boiler for plant use. Well water is treated by a hot process softener (HPS) and filtered through anthracite filters prior to being fed to the boilers. The high pressure steam is primarily used to lift the hammers at the drop forges, but some may be used for building heat. Before entering the hammer lift cylinders, oil (Citgo Cylinder Oil 680-7) is injected into the steam. The exhaust from the cylinders is captured in the low pressure steam header (6 to 8 psig) and distributed for other uses. The low pressure steam (which has been injected with cylinder oil) is used to heat the HPS (direct steam injection), for anvil heating, and for building heat throughout the facilities. Excess low pressure

steam is exhausted to atmosphere through a baffled separator and multi-port valve to maintain header pressure. The vented flow is measured and has been recorded over recent months. Visual examination of the data indicates that the average venting rate is approximately 12 to 15 million cubic feet per day during drop forge operation.

Condensate from the various area heaters, located throughout the facility, generally flows to the nearest drain and then ultimately to Pond 2. Because of the scattered locations of these heaters, no consideration was given in this study to collecting these streams.

The major sources of oil-contaminated condensate are the baffled separator on the low pressure steam exhaust, the separator on the steam line to the HPS, and the anvil heating lines. These flows have recently been routed to a 1500-gallon horizontal tank from which they drain to Pond 2. Water is drained from near the bottom of the tank through an elevated pipe which can be adjusted to maintain the water level in the tank at approximately 6 to 15 inches.

Mr. Keith Houseknecht, Manager of Plant Engineering for Canton Drop Forge, has estimated the total condensate flow at 3 gpm.

FLOW MUST BE CHECKED

Die lube/condensate

Mineral oil with graphite (DUBRO 500/550) is used on the forge dies and is drained with any condensate collected in the area to a gravity oil/water separator. The separated oil is returned to DUBRO Oil Corporation for reconditioning and returned for reuse. The underflow water is discharged to Pond 2.

No estimate of the flow from this stream is available.

FRESH WATER SUPPLY DUMPS TO RECIRC

Cooling Water (Recirculating System) Overflow

A recirculating cooling water system is provides cooling water and seal water to the furnaces and cooling water to the hydraulic presses. After use, the cooling water is collected in a cooling water return sump and returned through a cooling tower to the supply sump. The internals of the cooling tower have been dismantled and removed; now the return stream simply discharges at the top of the tower and free falls to the supply sump. Make-up well water is added to the supply sump based on the level. An overflow pipe from the supply sump discharges to Pond 2.

No estimate of the make-up water requirements is available.

NO MAKE UP CONSTANT OVERFLOW

Plant air is provided by an Ingersoll-Rand, water-cooled air compressor. Well water is used in the compressor oil cooler and after-cooler, then discharged to the circulating system supply sump. During the period that Parsons ES

observed the system operation on 13 May 1997, it appeared that the compressor cooling water supply exceeded the need for make-up water in the recirculating system, as the overflow operated ~~every time that the~~ return pumps ran.

Coal-fired Boiler Scrubber Discharge

The coal-fired boiler exhaust is equipped with a scrubber. Four to five gallons per minute (gpm) of well water are sprayed into the top of the tower, while the bulk of the scrubber water is recirculated and treated with lime and polymer. Sludge from the recirculated water tank is pumped to a hopper and excess water overflows to Pond 2. Overflow from the recirculation tank, as well as condensate from the boiler exhaust fan, also flows to Pond 2. The coal-fired boiler (and thus the scrubber system) is not regularly used, but is used periodically every winter. Facility records for January through April 1997 indicate that the coal-fired boiler was used for six days in January and 14 days in March.

Allowing for evaporation, the discharge should be less than the 4 to 5 gallons per minute of well water sprayed into the top of the scrubber.

HPS Blowdown

Chemical precipitates formed in the HPS are discharged to the sanitary sewer system . A 3/4" line runs continuously to limit solids build-up and a larger line (two or three inch) is manually opened one or two times a shift for a short period to remove larger solids that accumulate in the bottom of the tank. It is reported that lime solids from the process have collected in the sanitary sewer system for distances as great as one mile from the discharge point.

No estimate of the flow rate is available.

Boiler Blowdown

Continuous surface blowdown from the boilers and periodic blowdown of the mud drums is also discharged to the sanitary sewers.

No estimate of the flow rate is available.

Potential Use/Disposal of Process Water and Wastewater Streams

HPS Make-up Water

All boiler feed water is treated in the HPS. Most of the water is sourced from the on-site production wells; the only exception is the amount which results from the condensation of the low pressure steam that is injected into the unit for heating. A simple heat balance (neglecting heat losses through the tank walls and blowdown) indicates that approximately 173,500 gallons of well water and 253,500 pounds of low pressure steam are required per day to generate 1.7

million pounds of high pressure steam per day (the average production during system operation in April 1997). The condensed steam contributes 30,500 gallons to the boiler feed water stream.

PCR DAY

Cooling Water

Once-through cooling water is used in the plant air compressor and then discharged to the recirculating cooling system. Make-up water can also be added to the recirculating system as required. No measurement of either water flow is available. According to the air compressor manufacturer, total heat rejection from the unit is 607,000 BTU/hr. Recommended cooling water flow rates are based on a maximum exit temperature of 120° F. At an inlet water temperature of 60° F (assumed well water temperature), the recommended flow rate would be 20 gpm. Although the flow rate was not measured, it appears that a higher flow rate is used for air compressor cooling. As stated above, it appears that the compressor cooling water discharge exceeds the make-up requirements of the recirculating system.

PLUS PRESS HEAT EXCHANGER

Coal-fired Boiler Scrubber Water

The scrubber system uses 4 to 5 gpm of well water when operating. Since the coal-fired boiler only operates periodically, this water use is not always available.

RECIRC

Water Sampling and Analysis

On 13 May 1997, ten (10) samples were collected from six (6) sampling points (see below) and submitted for chemical analysis and for treatability testing. In addition, pH and temperature measurements were made at several of the sampling points at the same time. The laboratory results reported by Quanterra Environmental Services are attached and are summarized, along with the field data (i.e., pH and temperature), in Table 1. Following is a brief description of each sample point.

ANVIL LINE EXHAUST MANIFOLD HPS SEPARATOR

O1 Condensate Tank – The sample was collected from a sample valve on the discharge from the 1,500 gallon tank where the three oily condensate streams are combined before discharge to Pond 2.

O2 Pond 3 Influent – The sample was taken from below the surface of the pond in the inlet where the effluent from Pond 2 is discharged into Pond 3.

O3 HPS Separator Discharge – To collect this sample, the discharge from the HPS separator was temporarily routed outside (of the building), through existing piping which previously was used to discharge to Pond 2. The sample represents the discharge from the bottom of the separator and does not include drainage from the steam pipe leading to the separator.

Table 1										
Sampling Results										
SAMPLE	DATE	TIME	Temp (C)	O&G	pH	TDS	Alk.	Ca	Mg	Hard.
Condensate Tank	5/13/97	13:30	80.8	258	9.1					
Pond 3 Inlet	5/13/97	14:45		8.3						
HPS Separator Blowdown	5/13/97	14:15		1220						
Boiler Feed Water	5/13/97	13:40		5.4						
Boiler Feed Water	5/13/97	13:50			9.7	160	55.2	<5	<5	8
HPS Blowdown	5/13/97	14:00			10	310	2090	165	16.8	480
*pH in S.U., all others in mg/L; hardness and alkalinity are in mg/L as CaCO3										

MUST BE UP AROUND 10PH FOR HPS TO WORK

DUE TO CAUSTIC SODA

DROP TO PH 6-7 IT WILL STAY IN SUSPENSION

CDF002427

O4 Boiler Feed Water -- The sample was collected downstream of the anthracite filters, at the same location used by the boiler operators for routine boiler feed water tests.

H1 (A and B) HPS Blowdown -- The sample was collected from the large blowdown line (on the bottom of the HPS), which is used by the operator for periodic system blowdown. Two samples were required because of different preservatives required for the analyses to be conducted.

H2 (A and B) Boiler Feed Water -- Samples were collected at the same location as O4 above. Two samples were required because of different preservatives required for the analyses to be conducted.

Treatability Testing

Two five-gallon buckets of condensate were also collected from the 1,500-gallon tank (same location as sample O1 above). One bucket was sent to KOCH membrane systems for testing and the other was sent to Parsons ES in Syracuse, New York, for screening of other alternatives.

Membrane Filtration

KOCH Membrane Systems treated a portion of the supplied condensate through a membrane filter. They reported that the sample filtered very well, producing a clear filtrate with an O&G concentration of less than 2 mg/L. Samples of the resulting filtrate and concentrate were sent to you for visual observation. In the treatability testing, KOCH did not run the tests for a period long enough to fully concentrate the retentate. They report that the oil and grease (O&G) can be concentrated to about 25% with their hollow fiber unit and to 50% with their tubular unit. For an inlet O&G concentration of 250 mg/L, this represents a 1,000 or 2,000 fold increase in concentration.

KOCH has submitted proposals for both types (i.e., hollow fiber and tubular) of systems. A binder containing these quotes and other information was prepared for you by KOCH and is enclosed.

Screening Tests

Mr. Douglas Morrison, of Parsons ES' Syracuse Office, conducted a number of qualitative tests to identify other methods to potentially remove the oil from the condensate. These are summarized below:

Gravity Separation

Approximately one-third gallon of the condensate sample was allowed to settle over-night. No oil separation was observed.

Acid Cracking

Sulfuric acid was added to lower the pH to less than 2.0. No separation was observed in the first three to four hours but, after approximately 15 hours, a separate oil layer was observed.

Caustic

Sodium hydroxide was added to raise the pH above 13.0. The sample was checked after approximately 15 hours, but no oil separation was observed.

High Temperature

The sample was heated to above 90° C while mixing. No oil separation was observed during heating or subsequently cooling to room temperature.

Low Temperature

The temperature was decreased to 4° C. After 24 hours, no oil separation was observed.

Alum Addition

A high dosage of aluminum sulfate (alum) was added. There was no immediate effect but, after about 15 hours, a thin oil layer had formed and oily globules were observed at the bottom of the beaker. The middle layer was very clear.

Sodium Chloride Addition

A high dosage of sodium chloride was added to the sample. There was no immediate effect but, after about 15 hours, a distinct oil layer had formed with clear liquid below.

Filtration

An attempt to filter the sample through a 0.45 micron filter was made but the filter blinded almost immediately. A coarser filter (500 to 1,000 microns), generally used by Canton Drop Forge as a pre-filter, was then used and resulted in a clear filtrate and dark retentate. To verify that the retentate was O&G, the filter was rinsed with hexane. The hexane dissolved all of the visible material on the filter indicating that the retentate was O&G. Hexane was also applied to the filtrate to see if additional oil could be visibly removed. No change in appearance of the filtrate was observed.

Simple Filtration

Because of the apparent success of the filtration screening test, the remainder of the sample sent to Syracuse was delivered to a local laboratory for quantitative filtration testing. Samples were filtered using 500 micron, 25 micron, and 10 micron filters. The filtrate from each test was analyzed for O&G and the solids captured on the filter were measured. The results are presented in Table 2.

Table 2
Filtration Testing Results

Filter Size	Filtrate O&G	Solids removed by filter
No Filter	20 mg/L	—
500 micron	24 mg/L	<4 mg/L
25 micron	15 mg/L	5.7 mg/L
10 micron	11 mg/L	9.4 mg/L

HOW WAS OIL ADDED TO FILTERS?

These results indicate that low effluent O&G concentrations can be achieved through coarse filtration. Unfortunately, the analysis without filtration shows an influent O&G concentration of only 20 mg/L as opposed to the 258 mg/L reported by Quanterra Environmental Services. Although the sample was quite aged by the time that these tests were run, it is not anticipated that such a drastic reduction in the O&G concentration could have occurred. Another possibility is that O&G plated out on the plastic liner in the sample bucket used for transport. Again, it is not anticipated that this could result in such a drastic change in concentration. KOCH has since analyzed their sample for comparison; after three (3) weeks (without any steps taken towards preservation) since collection, the results have indicated that 92.9 mg/L of O&G was still present. Obviously, the results above are not consistent with those provided in the laboratory analyses completed by Quanterra and KOCH. The implication of these findings, as indicated in our recommendations, is that on-site testing with the selected technology should be completed prior to final design and installation.

Previously Conducted Tests

Information included in annual reports on boiler water treatment, submitted to Canton Drop Forge by Diversey Water Technologies, indicate that the O&G concentration in the condensate can be reduced to 4 to 13 mg/L through treatment by ferric chloride and polymers.

Evaluation of Alternatives

Wastewater Streams

The estimated volume and quality of the process water and wastewater streams, as they are currently generated, are summarized in Table 3. Information is presented for the period when the forges are operating (generally four days per week).

Table 3
Process Water and Wastewater Streams

Stream	Estimated Flow	Characteristics	Notes
Condensate	3 gpm	O&G = 250 mg/L Temperature is ~ 84° C.	Should be rather clean except for oil because it is derived from steam.
Die Lube/ Condensate	Unknown	May contain oil carry-over if O/W Separator is over-loaded. Residual oil concentration unknown	Apparently good oil separation occurs in the O/W Separator.
Recirculating System Overflow	Unknown	No significant oil contamination. May contain contaminants picked up from furnace seals.	
Coal-fired Boiler Scrubber Discharge	< 5 gpm	May contain contaminants from stack gas. Water is treated with lime and polymer before discharge.	
HPS Blowdown	Unknown	pH = 10, TDS = 310, and Temperature is ~ 100° C. Contains calcium carbonate. May be over-saturated with calcium, resulting in scaling properties.	Is currently discharged to the sanitary sewer.
Boiler Blowdown	Unknown	High purity water with some boiler treatment chemicals and inerts. Temperature is ~ 100° C.	Is currently discharged to the sanitary sewer.

Water Uses

The estimated usage and water quality requirements for candidate recycled water users are presented in Table 4. Information is presented for the period when the forges are operating (generally four days per week).

Table 4
Water Uses

Use	Estimated Flow	Required Water Quality	Notes
HPS Feed Water	173,500 gallons per day (120 gpm)	Restricted to contaminants which can be removed in HPS. System can remove some O&G.	High water temperature is acceptable
Air Compressor Cooling Water	20+ gpm	Non-scaling Non-corrosive <100° F	Required flow rate increases with increasing water temperature
Recirculating Cooling Water	Unknown	Non-scaling Non-corrosive <100° F	
Coal-fired Boiler Scrubber Water	4 to 5 gpm	Non-scaling	

Alternatives

Although further investigation may be warranted, there are no known problems with the process water and wastewater streams, except the oily condensate and the reported solids deposition in the sanitary sewer from the HPS blowdown. The focus of this study is elimination of the soluble oil in the condensate discharge to Pond 2.

Alternatives for disposal of the oily condensate (with or without further treatment) fall in three general categories--continued discharge to the pond system, discharge to the sanitary sewer system, and reuse somewhere at the facility. Treatment alternatives depend on the final disposition of the water and the required water quality. Treatment methods identified, which are effective to some degree for removing oil from the condensate, include membrane filtration, conventional filtration, ferric chloride/polymer treatment, acid treatment, alum treatment, and sodium chloride treatment.

Final Disposal

Discharge to Pond System

If the wastewater stream is discharged to the pond system, one or more environmental permits may be required. Since there is no off-site discharge from the pond system, typical discharge limits propbably do not apply to Canton Drop Forge. Although the limit for O&G in a wastewater discharged directly to a receiving stream is normally about 10 mg/L, the limit may be more restrictive in this case. Discussions with Ohio EPA, which have not been undertaken, would be required to verify the water quality requirements for this option.

LAGOON IS HA? 8.3 NOW?

Discharge to Sanitary Sewer

OLD? NOW 50?

The City of Massillon sewer use ordinance limits the O&G concentration of any discharge to 100 mg/L. Other limitations which might impact discharge of the condensate are that the pH can not be less than 5.0 or higher than 10 and the temperature "at the introduction into the City's wastewater treatment plant" cannot exceed 40 degrees Celsius (104° F)". No other known pollutants of concern are in the condensate, but the City may require further testing before accepting the discharge.

Reuse

The four potential locations identified for water reuse are summarized in Table 4. Of these, the two cooling water streams do not appear to be very practical because of the high temperature of the condensate. The condensate would have to be cooled considerably before use as a cooling water.

Reuse in the coal-fired boiler scrubber appears to be possible with limited pre-treatment of the condensate. Because of the intermittent nature of the scrubber operation, this disposal alternative is not available the majority of the time and, therefore, does not provide a means for continuous disposal of the condensate.

The only viable reuse alternative appears to be use as feed water to the HPS. This would require a high degree of oil removal but the high condensate temperature would be an advantage rather than a detriment to the process. Use of hot condensate as part of the feed water would reduce the steam requirement to heat the incoming feed water. A simplified heat balance indicates that the steam requirement would be reduced by approximately 6,000 lb/day.

The major concern with reuse of the condensate is the impact of any residual oil on the receiving system. Membrane-filtered condensate with an oil concentration less than 2 mg/L would probably not impact the system. The HPS system may adequately handle higher concentrations. One concern is the measured O&G concentration of 5.4 mg/L in the boiler feed water. This is near the detection limit for the test and, therefore, may be suspect. However, it is

desirable that the O&G concentration in the boiler feed water be less than 1.0 mg/L. Further testing should be conducted to confirm that the O&G concentration is really this high.

If O&G is getting into the boiler feed water, the most likely source is the low pressure steam used to heat the HPS. The discharge from the separator (on the steam line) to the HPS had a high O&G concentration (although the flow rate was very low), indicating that oil is being carried with the steam to at least that point. Theoretically, reducing the steam use by using hot condensate with low O&G content, would reduce the oil contamination from the source. However, the estimated reduction in steam use is only about 2.5 percent. Flocculant systems are available to remove O&G from boiler feed water, if needed.

Treatment Options

Membrane Filtration

The treatability testing using a membrane filter indicated that the O&G concentration of the condensate can be reduced to less than 2 mg/L. KOCH has proposed two different units that can do the job; however, both require a significant reduction in the condensate temperature because of temperature limitations of the membranes. The hollow fiber system would cost $34,000 and would require the temperature to be reduced to 113° F or less. This unit has a smaller foot print than the tubular system but can only concentrate the retentate to about 25 percent O&G.

The tubular system costs $41,500 and requires a temperature reduction to at least 140° F. This unit is capable of concentrating the retentate to approximately 50 percent O&G.

KOCH indicates that higher temperature membranes can be supplied, but they will result in a lesser quality filtrate and will increase the cost of the unit by a factor of 1.5 to 2. Parsons ES has requested information from other manufacturers regarding high temperature membranes.

Conventional Filtration

Conventional filtration appears to provide good oil removal. Based on the tests described above, the O&G in the treated condensate may not be low enough for reuse in the HPS or discharge to the pond system, but would easily meet the City's requirements for discharge to the sanitary sewer. This option can be further evaluated by installing a temporary pump and cartridge filter. The system could be run for a few days to determine the life of the filter cartridges and to obtain additional discharge samples to determine the achievable O&G concentration. A permanent system using a high temperature condensate pump and cartridge filters could be installed for less than $5,000.

& To Check flow

Chemical Treatment

Testing of a number of chemical treatment options has identified which can reduce the O&G concentration to a low level. Canton Drop Forge has indicated that a primary objective of this effort is to implement a system requiring minimal operator attention. Since these alternatives do not fulfill this requirement, they were not evaluated further.

Alternative Oil for Cylinder Lubrication

Canton Drop Forge is investigating alternative oils for injection into the steam supply to the cylinders, which may be less likely to solubilize in the condensate. This appears to be a worthwhile effort, which may result in an oil that is more readily separated from the condensate and/or may result in less carry-over of oil to the HPS.

Recommendations

The best alternatives for disposal of the condensate appear to be treatment through cartridge filters and discharge to the sanitary sewer or treatment through cartridge filters (or membrane filters, if necessary), and reuse in the HPS. Before pursuing either course of action, the following actions are recommended.

1. Monitor the condensate stream to determine the average and peak flow rates. The simplest method of flow measurement would be to operate the 1,500 gallon condensate tank in a fill-and-draw method, while monitoring the time required to fill the tank.

2. Install a temporary cartridge filtration system (acquired by borrowing or leasing a unit from a prospective supplier) to evaluate the cartridge change frequency and the sustained effluent quality obtainable.

3. If results are satisfactory and it is desired to discharge to the sanitary sewer, discuss proposed discharge with the City of Massillon to define requirements for further testing/applications.

4. If it is desired to use treated condensate in the HPS, further sampling of the boiler feed water should be conducted to determine the present O&G concentration. Discussions should be held with the HPS manufacturer, the boiler manufacturer, and/or the boiler water treatment specialists to confirm the limitations on the O&G concentration in the HPS feed water.

5. If sufficient O&G reduction cannot be obtained by using a cartridge filter, arrange for on-site testing of one or membrane filters to verify the achievable performance and sizing parameters.

HPS Blowdown

It has been reported that the City of Massillon's sanitary sewer authority is reluctant to accept the condensate flow because of the reported problems with solids deposition from the HPS blowdown. Discharge of lime sludge to sanitary sewer systems is not unusual. The sample analysis of this study indicates that the blowdown is over-saturated with calcium but, because of the calcium carbonate solids in the blowdown, any precipitation probably occurs on the solids rather than on the pipe walls. If solids are building up in the sewer, it probably indicates that there is not sufficient flow to maintain the solids in suspension. Several options are available for improving this situation. These are:

HPS systems are unusual

1. The point of discharge of the blowdown to the sanitary sewer could be relocated to a place where more flow is present on a continuous basis.

2. The blowdown could be modified by eliminating the small continuous blowdown and using only the periodic manual blowdown. Ideally a schedule could be established that would maintain the treated water quality while using less frequent blowdown at a higher flow rate to keep the solids flowing in the sewer. The blowdown could be automated to eliminate dependence on manual operation.

3. If it is decided to discharge treated condensate to the sanitary sewer, the additional flow may be used to advantage to assist in keeping the solids flowing in the line.

Summary

In summary, Parsons ES recommends that Canton Drop Forge consider use of cartridge filters for treatment of the oil-contaminated condensate stream. Prior to purchasing and installing a cartridge filtration system, it is recommended that certain measurements and observations be made and a trial application be made. If successful in reducing oil content to the desired levels, the resulting stream can then be discharged to the HPS or the sanitary sewer. This option can be accomplished for $5,000, or less, provided that the prospective equipment vendor(s) is(are) willing to loan Canton Drop Forge a system for pre-purchase treatability testing.

With respect to the HPS blowdown, the recommendations listed above could be implemented. By combining the two streams and, hence, increasing the flow, the HPS blowdown issue may also be resolved.

I CAN'T BELIEVE THEY INCREASE THE FLOW WITHOUT HAVING THIS SITUATION

2(b), 1(c)

29 May 1997

MEMORANDUM

To: Mr. Keith Houseknecht, Canton Drop Forge
Fax: (330) 477-2045
From: M. R. Leffler, Parsons ES
Subject: Wastewater Recycling and/or Treatment

Here is a brief summary of our findings to date. All results and observations should be considered preliminary.

1. Samples were collected and delivered to Quanterra Environmental Services for analysis. The results of these analysis with some field pH and temperature measurements are summarized on the attached table. The Pond 3 inlet sample was collected from the pond in a small inlet near the point of discharge from Pond 2.

   The oil & grease concentration in the condensate tank was 258 mg/L which is on the low side, but in the range you had previously reported. The HPS separator blowdown was significantly higher. Note that there is 5.4 mg/L of oil & grease in the boiler feed water. This is near the detection limit of 5.0 for the analysis, but indicates that oil and grease is getting through the HPS system.

2. A five gallon sample from the condensate tank was sent to KOCH Membrane Systems for trial ultra-filtration. They reported that the material filtered very well producing a clear filtrate with an oil & grease concentration of <2 mg/L. They returned samples to you. KOCH did not run the sample to maximum retentate concentration because of limited sample volume. They say that it could be concentrated to 25 to 30% oil and grease. Starting with 250 mg/L oil & grease in the condensate, the concentration ratio would be 1,000 to 1 or greater. KOCH has not yet provided sizing and cost data.

3. I also sent a five gallon sample of the condensate to our Syracuse office for testing. They did qualitative tests for emulsion breaking by trying various methods and visually observing for oil separation. Methods tested were gravity separation, acid cracking, caustic cracking, high temperature (90 °C), low temperature (4 °C), alum addition, sodium chloride addition, and filtration. Except for filtration, no test produced immediately results; however, when allowed to set overnight (15 hours), separation was observed in the samples treated with acid, alum, and sodium chloride. Filtration through a fine filter (0.45 micron) plugged the

filter immediately, but filtration through a coarse filter (500 to 1000 micron) produced a clear filtrate and a dark retentate. Qualitative testing indicated that the retentate was essentially all oil and grease.

4. Since simple filtration looked favorable, our Syracuse office sent the remaining sample out to a local lab for filtration testing. They reported the following results:

Filter Size	Filtrate O&G	Solids removed by filter
No Filter	20 mg/L	--
500 micron	24 mg/L	<4 mg/L
25 micron	15 mg/L	5.7 mg/L
10 micron	11 mg/L	9.4 mg/L

The oil & grease analysis with no filtration is an order of magnitude different than the results obtained from Quanterra. We are checking this number. The results indicate that simple filtration reduce the oil & grease to low levels.

5. Preliminary options analysis--Apparently ultrafiltration will clean the condensate to a high level, but simple filtration might be sufficient at much lower cost. We are considering recommending an on site with a cartridge filter to see how frequently filter changes may be required, and what quality of effluent can be obtained.

The best candidate for recycling appears to be to return the condensate to the hot process softener. This process can handle some oil and grease, but since there is already measurable oil and grease in the boiler feed water, it may not be desirable to introduce more oil and grease into the process.

The other continuous water user identified is the compressor cooling water system. This once-through flow discharges to the furnace cooling system. To be used as cooling water, the condensate would have to be cooled. It appears that the cooling water flow exceeds the need for make-up water in the furnace cooling water system so the treated condensate would still be discharged to Pond 2.

The City of Massilon sewer use ordinance limits oil & grease to 100 mg/L; therefore, it would not be difficult to meet this limit through simple filtration. Other limits of concern are maximum pH 10 and maximum temperature of 104 °F at the entrance to the treatment plant.

Because of the high oil and grease in the HPS separator blowdown, and the presence of oil and grease in the boiler feed water, there is apparently significant oil and grease carried over in the steam to the HPS. Your

CANTON DROP FORGE WATER RECYCLING										
SAMPLING RESULTS										
SAMPLE	DATE	TIME	Temp (C)	O&G	pH	TDS	Alk.	Ca	Mg	Hard.
Condensate Tank	5/13/97	13:30	80.8	258	9.1					
Pond 3 Inlet	5/13/97	14:45		8.3						
HPS Separator Blowdown	5/13/97	14:15		1220						
Boiler Feed Water	5/13/97	13:40		5.4						
Boiler Feed Water	5/13/97	13:50			9.7	160	55.2	<5	<5	8
HPS Blowdown	5/13/97	14:00			10	310	2090	165	16.8	480
*pH in S.U., all others in mg/L										

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To Keith Housekneckt	From Ed Kantzler
Co. Canton Drop Forge	Co.
Dept.	Phone #
Fax # 330-477-2016	Fax #

2(b), 3, 7, 1(c)

Draft

CANTON DROP FORGE PROCESS WATER AND WASTEWATER RECYCLING/TREATMENT INVESTIGATION SUMMARY REPORT

Introduction

Canton Drop Forge generates a number of process water and wastewater streams, primarily derived from boiler water treatment, condensate and cooling water streams. Some of the wastewater is discharged to the sanitary sewer system for treatment at the City of Massillon wastewater treatment plant; the remaining streams are discharged to an on-site pond system which also handles the site storm water drainage. Wastewater streams are discharged to Pond 2, which is equipped with an oil skimmer and which removes floating oils which may reach the pond. The discharge of Pond 2 is pumped to Pond 3. There is no surface discharge from Pond 3.

All water at the facility comes from Canton Drop Forge wells. Water production is not recorded.

The purposes of this investigation are to identify the most appropriate alternatives for treating, recycling, and/or disposing of the process water and wastewater streams generated by Canton Drop Forge and to avoid discharge of oil-contaminated streams to the on-site ponds. Of primary interest is the condensate flow which contains solubilized oils that do not separate readily in a gravity oil/water separator.

Process Water and Wastewater Streams

Condensate

High pressure steam (150 psig) is generated by two gas boilers and one coal-fired boiler for plant use. Well water is treated by a hot process softener (HPS) and filtered through anthracite filters prior to being fed to the boilers. The high pressure steam is primarily used to lift the hammers at the drop forges, but some may be used for building heat. Before entering the hammer lift cylinders, oil (Citgo Cylinder Oil 680-7) is injected into the steam. The exhaust from the cylinders is captured in the low pressure steam header (6 to 8 psig) and distributed for other uses. The low pressure steam (which has been injected with cylinder oil) is used to heat the HPS (direct steam injection), for anvil heating, and for building heat throughout the facilities. Excess low pressure

steam is exhausted to atmosphere through a baffled separator and multi-port valve to maintain header pressure. The vented flow is measured and has been recorded over recent months. Visual examination of the data indicates that the average venting rate is approximately 12 to 15 million cubic feet per day during drop forge operation.

Condensate from the various area heaters, located throughout the facility, generally flows to the nearest drain and then ultimately to Pond 2. Because of the scattered locations of these heaters, no consideration was given in this study to collecting these streams.

The major sources of oil-contaminated condensate are the baffled separator on the low pressure steam exhaust, the separator on the steam line to the HPS, and the anvil heating lines. These flows have recently been routed to a 1500-gallon horizontal tank from which they drain to Pond 2. Water is drained from near the bottom of the tank through an elevated pipe which can be adjusted to maintain the water level in the tank at approximately 6 to 15 inches.

Mr. Keith Houseknecht, Manager of Plant Engineering for Canton Drop Forge, has estimated the total condensate flow at 3 gpm.

FLOW MUST BE CHECKED

Die lube/condensate

Mineral oil with graphite (DUBRO 500/550) is used on the forge dies and is drained with any condensate collected in the area to a gravity oil/water separator. The separated oil is returned to DUBRO Oil Corporation for reconditioning and returned for reuse. The underflow water is discharged to Pond 2.

No estimate of the flow from this stream is available.

FRESH WATER SUPPLY DUMPS TO RECIRC

Cooling Water (Recirculating System) Overflow

A recirculating cooling water system is provides cooling water and seal water to the furnaces and cooling water to the hydraulic presses. After use, the cooling water is collected in a cooling water return sump and returned through a cooling tower to the supply sump. The internals of the cooling tower have been dismantled and removed; now the return stream simply discharges at the top of the tower and free falls to the supply sump. Make-up well water is added to the supply sump based on the level. An overflow pipe from the supply sump discharges to Pond 2.

No estimate of the make-up water requirements is available.

NO MAKE UP CONSTANT OVERFLOW

Plant air is provided by an Ingersoll-Rand, water-cooled air compressor. Well water is used in the compressor oil cooler and after-cooler, then discharged to the circulating system supply sump. During the period that Parsons ES

observed the system operation on 13 May 1997, it appeared that the compressor cooling water supply exceeded the need for make-up water in the recirculating system, as the overflow operated ~~every time that the~~ return pumps ran.

Coal-fired Boiler Scrubber Discharge

The coal-fired boiler exhaust is equipped with a scrubber. Four to five gallons per minute (gpm) of well water are sprayed into the top of the tower, while the bulk of the scrubber water is recirculated and treated with lime and polymer. Sludge from the recirculated water tank is pumped to a hopper and excess water overflows to Pond 2. Overflow from the recirculation tank, as well as condensate from the boiler exhaust fan, also flows to Pond 2. The coal-fired boiler (and thus the scrubber system) is not regularly used, but is used periodically every winter. Facility records for January through April 1997 indicate that the coal-fired boiler was used for six days in January and 14 days in March.

Allowing for evaporation, the discharge should be less than the 4 to 5 gallons per minute of well water sprayed into the top of the scrubber.

HPS Blowdown

Chemical precipitates formed in the HPS are discharged to the sanitary sewer system . A 3/4" line runs continuously to limit solids build-up and a larger line (two or three inch) is manually opened one or two times a shift for a short period to remove larger solids that accumulate in the bottom of the tank. It is reported that lime solids from the process have collected in the sanitary sewer system for distances as great as one mile from the discharge point.

No estimate of the flow rate is available.

Boiler Blowdown

Continuous surface blowdown from the boilers and periodic blowdown of the mud drums is also discharged to the sanitary sewers.

No estimate of the flow rate is available.

Potential Use/Disposal of Process Water and Wastewater Streams

HPS Make-up Water

All boiler feed water is treated in the HPS. Most of the water is sourced from the on-site production wells; the only exception is the amount which results from the condensation of the low pressure steam that is injected into the unit for heating. A simple heat balance (neglecting heat losses through the tank walls and blowdown) indicates that approximately 173,500 gallons of well water and 253,500 pounds of low pressure steam are required per day to generate 1.7

million pounds of high pressure steam per day (the average production during system operation in April 1997). The condensed steam contributes 30,500 gallons to the boiler feed water stream.

PER DAY

Cooling Water

Once-through cooling water is used in the plant air compressor and then discharged to the recirculating cooling system. Make-up water can also be added to the recirculating system as required. No measurement of either water flow is available. According to the air compressor manufacturer, total heat rejection from the unit is 607,000 BTU/hr. Recommended cooling water flow rates are based on a maximum exit temperature of 120° F. At an inlet water temperature of 60° F (assumed well water temperature), the recommended flow rate would be 20 gpm. Although the flow rate was not measured, it appears that a higher flow rate is used for air compressor cooling. As stated above, it appears that the compressor cooling water discharge exceeds the make-up requirements of the recirculating system.

PLUS PRESS HEAT EXCHANGER

Coal-fired Boiler Scrubber Water

RECIRC

The scrubber system uses 4 to 5 gpm of well water when operating. Since the coal-fired boiler only operates periodically, this water use is not always available.

Water Sampling and Analysis

On 13 May 1997, ten (10) samples were collected from six (6) sampling points (see below) and submitted for chemical analysis and for treatability testing. In addition, pH and temperature measurements were made at several of the sampling points at the same time. The laboratory results reported by Quanterra Environmental Services are attached and are summarized, along with the field data (i.e., pH and temperature), in Table 1. Following is a brief description of each sample point.

ANVIL LINE EXHAUST MANIFOLD HPS SEPARATOR

O1 Condensate Tank – The sample was collected from a sample valve on the discharge from the 1,500 gallon tank where the three oily condensate streams are combined before discharge to Pond 2.

O2 Pond 3 Influent – The sample was taken from below the surface of the pond in the inlet where the effluent from Pond 2 is discharged into Pond 3.

O3 HPS Separator Discharge – To collect this sample, the discharge from the HPS separator was temporarily routed outside (of the building), through existing piping which previously was used to discharge to Pond 2. The sample represents the discharge from the bottom of the separator and does not include drainage from the steam pipe leading to the separator.

Table 1										
Sampling Results										
SAMPLE	DATE	TIME	Temp (C)	O&G	pH	TDS	Alk.	Ca	Mg	Hard.
Condensate Tank	5/13/97	13:30	80.8	258	9.1					
Pond 3 Inlet	5/13/97	14:45		8.3						
HPS Separator Blowdown	5/13/97	14:15		1220						
Boiler Feed Water	5/13/97	13:40		5.4						
Boiler Feed Water	5/13/97	13:50			9.7	160	55.2	<5	<5	8
HPS Blowdown	5/13/97	14:00			10	310	2090	165	16.8	480
*pH in S.U., all others in mg/L; hardness and alkalinity are in mg/L as CaCO3										

MUST BE UP AROUND 10 PH FOR HPS TO WORK

DUE TO CAUSTIC SODA

DROP TO PH 6-7 IT WILL STAY IN SUSPENSION

O4 Boiler Feed Water – The sample was collected downstream of the anthracite filters, at the same location used by the boiler operators for routine boiler feed water tests.

H1 (A and B) HPS Blowdown – The sample was collected from the large blowdown line (on the bottom of the HPS), which is used by the operator for periodic system blowdown. Two samples were required because of different preservatives required for the analyses to be conducted.

H2 (A and B) Boiler Feed Water – Samples were collected at the same location as O4 above. Two samples were required because of different preservatives required for the analyses to be conducted.

Treatability Testing

Two five-gallon buckets of condensate were also collected from the 1,500-gallon tank (same location as sample O1 above). One bucket was sent to KOCH membrane systems for testing and the other was sent to Parsons ES in Syracuse, New York, for screening of other alternatives.

Membrane Filtration

KOCH Membrane Systems treated a portion of the supplied condensate through a membrane filter. They reported that the sample filtered very well, producing a clear filtrate with an O&G concentration of less than 2 mg/L. Samples of the resulting filtrate and concentrate were sent to you for visual observation. In the treatability testing, KOCH did not run the tests for a period long enough to fully concentrate the retentate. They report that the oil and grease (O&G) can be concentrated to about 25% with their hollow fiber unit and to 50% with their tubular unit. For an inlet O&G concentration of 250 mg/L, this represents a 1,000 or 2,000 fold increase in concentration.

KOCH has submitted proposals for both types (i.e., hollow fiber and tubular) of systems. A binder containing these quotes and other information was prepared for you by KOCH and is enclosed.

Screening Tests

Mr. Douglas Morrison, of Parsons ES' Syracuse Office, conducted a number of qualitative tests to identify other methods to potentially remove the oil from the condensate. These are summarized below:

Gravity Separation

Approximately one-third gallon of the condensate sample was allowed to settle over-night. No oil separation was observed.

Acid Cracking

Sulfuric acid was added to lower the pH to less than 2.0. No separation was observed in the first three to four hours but, after approximately 15 hours, a separate oil layer was observed.

Caustic

Sodium hydroxide was added to raise the pH above 13.0. The sample was checked after approximately 15 hours, but no oil separation was observed.

High Temperature

The sample was heated to above 90° C while mixing. No oil separation was observed during heating or subsequently cooling to room temperature.

Low Temperature

The temperature was decreased to 4° C. After 24 hours, no oil separation was observed.

Alum Addition

A high dosage of aluminum sulfate (alum) was added. There was no immediate effect but, after about 15 hours, a thin oil layer had formed and oily globules were observed at the bottom of the beaker. The middle layer was very clear.

Sodium Chloride Addition

A high dosage of sodium chloride was added to the sample. There was no immediate effect but, after about 15 hours, a distinct oil layer had formed with clear liquid below.

Filtration

An attempt to filter the sample through a 0.45 micron filter was made but the filter blinded almost immediately. A coarser filter (500 to 1,000 microns), generally used by Canton Drop Forge as a pre-filter, was then used and resulted in a clear filtrate and dark retentate. To verify that the retentate was O&G, the filter was rinsed with hexane. The hexane dissolved all of the visible material on the filter indicating that the retentate was O&G. Hexane was also applied to the filtrate to see if additional oil could be visibly removed. No change in appearance of the filtrate was observed.

Simple Filtration

Because of the apparent success of the filtration screening test, the remainder of the sample sent to Syracuse was delivered to a local laboratory for quantitative filtration testing. Samples were filtered using 500 micron, 25 micron, and 10 micron filters. The filtrate from each test was analyzed for O&G and the solids captured on the filter were measured. The results are presented in Table 2.

Table 2
Filtration Testing Results

Filter Size	Filtrate O&G	Solids removed by filter
No Filter	20 mg/L	–
500 micron	24 mg/L	<4 mg/L
25 micron	15 mg/L	5.7 mg/L
10 micron	11 mg/L	9.4 mg/L

HOW WAS OIL ADDED TO FILTERS?

These results indicate that low effluent O&G concentrations can be achieved through coarse filtration. Unfortunately, the analysis without filtration shows an influent O&G concentration of only 20 mg/L as opposed to the 258 mg/L reported by Quanterra Environmental Services. Although the sample was quite aged by the time that these tests were run, it is not anticipated that such a drastic reduction in the O&G concentration could have occurred. Another possibility is that O&G plated out on the plastic liner in the sample bucket used for transport. Again, it is not anticipated that this could result in such a drastic change in concentration. KOCH has since analyzed their sample for comparison; after three (3) weeks (without any steps taken towards preservation) since collection, the results have indicated that 92.9 mg/L of O&G was still present. Obviously, the results above are not consistent with those provided in the laboratory analyses completed by Quanterra and KOCH. The implication of these findings, as indicated in our recommendations, is that on-site testing with the selected technology should be completed prior to final design and installation.

Previously Conducted Tests

Information included in annual reports on boiler water treatment, submitted to Canton Drop Forge by Diversey Water Technologies, indicate that the O&G concentration in the condensate can be reduced to 4 to 13 mg/L through treatment by ferric chloride and polymers.

Evaluation of Alternatives

Wastewater Streams

The estimated volume and quality of the process water and wastewater streams, as they are currently generated, are summarized in Table 3. Information is presented for the period when the forges are operating (generally four days per week).

Table 3
Process Water and Wastewater Streams

Stream	Estimated Flow	Characteristics	Notes
Condensate	3 gpm	O&G = 250 mg/L Temperature is ~ 84° C.	Should be rather clean except for oil because it is derived from steam.
Die Lube/ Condensate	Unknown	May contain oil carry-over if O/W Separator is over-loaded. Residual oil concentration unknown	Apparently good oil separation occurs in the O/W Separator.
Recirculating System Overflow	Unknown	No significant oil contamination. May contain contaminants picked up from furnace seals.	
Coal-fired Boiler Scrubber Discharge	< 5 gpm	May contain contaminants from stack gas. Water is treated with lime and polymer before discharge.	
HPS Blowdown	Unknown	pH = 10, TDS = 310, and Temperature is ~ 100° C. Contains calcium carbonate. May be over-saturated with calcium, resulting in scaling properties.	Is currently discharged to the sanitary sewer.
Boiler Blowdown	Unknown	High purity water with some boiler treatment chemicals and inerts. Temperature is ~ 100° C.	Is currently discharged to the sanitary sewer.

Water Uses

The estimated usage and water quality requirements for candidate recycled water users are presented in Table 4. Information is presented for the period when the forges are operating (generally four days per week).

Table 4
Water Uses

Use	Estimated Flow	Required Water Quality	Notes
HPS Feed Water	173,500 gallons per day (120 gpm)	Restricted to contaminants which can be removed in HPS. System can remove some O&G.	High water temperature is acceptable
Air Compressor Cooling Water	20+ gpm	Non-scaling Non-corrosive <100° F	Required flow rate increases with increasing water temperature
Recirculating Cooling Water	Unknown	Non-scaling Non-corrosive <100° F	
Coal-fired Boiler Scrubber Water	4 to 5 gpm	Non-scaling	

Alternatives

Although further investigation may be warranted, there are no known problems with the process water and wastewater streams, except the oily condensate and the reported solids deposition in the sanitary sewer from the HPS blowdown. The focus of this study is elimination of the soluble oil in the condensate discharge to Pond 2.

Alternatives for disposal of the oily condensate (with or without further treatment) fall in three general categories--continued discharge to the pond system, discharge to the sanitary sewer system, and reuse somewhere at the facility. Treatment alternatives depend on the final disposition of the water and the required water quality. Treatment methods identified, which are effective to some degree for removing oil from the condensate, include membrane filtration, conventional filtration, ferric chloride/polymer treatment, acid treatment, alum treatment, and sodium chloride treatment.

Final Disposal

Discharge to Pond System

If the wastewater stream is discharged to the pond system, one or more environmental permits may be required. Since there is no off-site discharge from the pond system, typical discharge limits propbably do not apply to Canton Drop Forge. Although the limit for O&G in a wastewater discharged directly to a receiving stream is normally about 10 mg/L, the limit may be more restrictive in this case. Discussions with Ohio EPA, which have not been undertaken, would be required to verify the water quality requirements for this option.

Discharge to Sanitary Sewer

The City of Massillon sewer use ordinance limits the O&G concentration of any discharge to 100 mg/L. Other limitations which might impact discharge of the condensate are that the pH can not be less than 5.0 or higher than 10 and the temperature "at the introduction into the City's wastewater treatment plant" cannot exceed 40 degrees Celsius (104° F)". No other known pollutants of concern are in the condensate, but the City may require further testing before accepting the discharge.

Reuse

The four potential locations identified for water reuse are summarized in Table 4. Of these, the two cooling water streams do not appear to be very practical because of the high temperature of the condensate. The condensate would have to be cooled considerably before use as a cooling water.

Reuse in the coal-fired boiler scrubber appears to be possible with limited pre-treatment of the condensate. Because of the intermittent nature of the scrubber operation, this disposal alternative is not available the majority of the time and, therefore, does not provide a means for continuous disposal of the condensate.

The only viable reuse alternative appears to be use as feed water to the HPS. This would require a high degree of oil removal but the high condensate temperature would be an advantage rather than a detriment to the process. Use of hot condensate as part of the feed water would reduce the steam requirement to heat the incoming feed water. A simplified heat balance indicates that the steam requirement would be reduced by approximately 6,000 lb/day.

The major concern with reuse of the condensate is the impact of any residual oil on the receiving system. Membrane-filtered condensate with an oil concentration less than 2 mg/L would probably not impact the system. The HPS system may adequately handle higher concentrations. One concern is the measured O&G concentration of 5.4 mg/L in the boiler feed water. This is near the detection limit for the test and, therefore, may be suspect. However, it is

desirable that the O&G concentration in the boiler feed water be less than 1.0 mg/L. Further testing should be conducted to confirm that the O&G concentration is really this high.

If O&G is getting into the boiler feed water, the most likely source is the low pressure steam used to heat the HPS. The discharge from the separator (on the steam line) to the HPS had a high O&G concentration (although the flow rate was very low), indicating that oil is being carried with the steam to at least that point. Theoretically, reducing the steam use by using hot condensate with low O&G content, would reduce the oil contamination from the source. However, the estimated reduction in steam use is only about 2.5 percent. Flocculant systems are available to remove O&G from boiler feed water, if needed.

Treatment Options

Membrane Filtration

The treatability testing using a membrane filter indicated that the O&G concentration of the condensate can be reduced to less than 2 mg/L. KOCH has proposed two different units that can do the job; however, both require a significant reduction in the condensate temperature because of temperature limitations of the membranes. The hollow fiber system would cost $34,000 and would require the temperature to be reduced to 113° F or less. This unit has a smaller foot print than the tubular system but can only concentrate the retentate to about 25 percent O&G.

The tubular system costs $41,500 and requires a temperature reduction to at least 140° F. This unit is capable of concentrating the retentate to approximately 50 percent O&G.

KOCH indicates that higher temperature membranes can be supplied, but they will result in a lesser quality filtrate and will increase the cost of the unit by a factor of 1.5 to 2. Parsons ES has requested information from other manufacturers regarding high temperature membranes.

Conventional Filtration

Conventional filtration appears to provide good oil removal. Based on the tests described above, the O&G in the treated condensate may not be low enough for reuse in the HPS or discharge to the pond system, but would easily meet the City's requirements for discharge to the sanitary sewer. This option can be further evaluated by installing a temporary pump and cartridge filter. The system could be run for a few days to determine the life of the filter cartridges and to obtain additional discharge samples to determine the achievable O&G concentration. A permanent system using a high temperature condensate pump and cartridge filters could be installed for less than $5,000.

& To Check flow

Chemical Treatment

Testing of a number of chemical treatment options has identified which can reduce the O&G concentration to a low level. Canton Drop Forge has indicated that a primary objective of this effort is to implement a system requiring minimal operator attention. Since these alternatives do not fulfill this requirement, they were not evaluated further.

Alternative Oil for Cylinder Lubrication

Canton Drop Forge is investigating alternative oils for injection into the steam supply to the cylinders, which may be less likely to solubilize in the condensate. This appears to be a worthwhile effort, which may result in an oil that is more readily separated from the condensate and/or may result in less carry-over of oil to the HPS.

Recommendations

The best alternatives for disposal of the condensate appear to be treatment through cartridge filters and discharge to the sanitary sewer or treatment through cartridge filters (or membrane filters, if necessary), and reuse in the HPS. Before pursuing either course of action, the following actions are recommended.

1. Monitor the condensate stream to determine the average and peak flow rates. The simplest method of flow measurement would be to operate the 1,500 gallon condensate tank in a fill-and-draw method, while monitoring the time required to fill the tank.

2. Install a temporary cartridge filtration system (acquired by borrowing or leasing a unit from a prospective supplier) to evaluate the cartridge change frequency and the sustained effluent quality obtainable.

3. If results are satisfactory and it is desired to discharge to the sanitary sewer, discuss proposed discharge with the City of Massillon to define requirements for further testing/applications.

4. If it is desired to use treated condensate in the HPS, further sampling of the boiler feed water should be conducted to determine the present O&G concentration. Discussions should be held with the HPS manufacturer, the boiler manufacturer, and/or the boiler water treatment specialists to confirm the limitations on the O&G concentration in the HPS feed water.

5. If sufficient O&G reduction cannot be obtained by using a cartridge filter, arrange for on-site testing of one or membrane filters to verify the achievable performance and sizing parameters.

HPS Blowdown

It has been reported that the City of Massillon's sanitary sewer authority is reluctant to accept the condensate flow because of the reported problems with solids deposition from the HPS blowdown. Discharge of lime sludge to sanitary sewer systems is not unusual. The sample analysis of this study indicates that the blowdown is over-saturated with calcium but, because of the calcium carbonate solids in the blowdown, any precipitation probably occurs on the solids rather than on the pipe walls. If solids are building up in the sewer, it probably indicates that there is not sufficient flow to maintain the solids in suspension. Several options are available for improving this situation. These are:

1. The point of discharge of the blowdown to the sanitary sewer could be relocated to a place where more flow is present on a continuous basis.

2. The blowdown could be modified by eliminating the small continuous blowdown and using only the periodic manual blowdown. Ideally a schedule could be established that would maintain the treated water quality while using less frequent blowdown at a higher flow rate to keep the solids flowing in the sewer. The blowdown could be automated to eliminate dependence on manual operation.

3. If it is decided to discharge treated condensate to the sanitary sewer, the additional flow may be used to advantage to assist in keeping the solids flowing in the line.

Summary

In summary, Parsons ES recommends that Canton Drop Forge consider use of cartridge filters for treatment of the oil-contaminated condensate stream. Prior to purchasing and installing a cartridge filtration system, it is recommended that certain measurements and observations be made and a trial application be made. If successful in reducing oil content to the desired levels, the resulting stream can then be discharged to the HPS or the sanitary sewer. This option can be accomplished for $5,000, or less, provided that the prospective equipment vendor(s) is(are) willing to loan Canton Drop Forge a system for pre-purchase treatability testing.

With respect to the HPS blowdown, the recommendations listed above could be implemented. By combining the two streams and, hence, increasing the flow, the HPS blowdown issue may also be resolved.

PARSONS ENGINEERING SCIENCE, INC.

REMIT PAYMENT TO:
File 91849
Los Angeles, CA 90074-1849
Attn: Accounts Receivables

Street Address:
19101 VILLAVIEW ROAD, SUITE 301
CLEVELAND, OHIO 44119

Tel: (216) 486-9006
Fax: (216) 486-6119

I N V O I C E

2(b)

NOVEMBER 12, 1997

CLIENT REF. :
INVOICE NO. : 00910959
PROJECT NO. : 731549-T1
CLIENT NO. : 71275

TO: CANTON DROP FORGE, INC.
4575 SOUTHWAY STREET
CANTON, OHIO 44706

ATTN: MR. KEITH HOUSEKNECHT

PLEASE REMIT TO:
PARSONS ENGINEERING SCIENCE, INC
FILE 91849
LOS ANGELES, CALIFORNIA 90074-1849

FOR: CANTON DROP FORGE, WASTEWATER RECYCLING
AUTHORIZATION: P.O. #98252
WBS 01000 - INVESTIGATION
AMOUNT AUTHORIZED: $7,000.00

BILLING PERIOD: 9/27/97 THROUGH 10/31/97

	CUR. HOURS	CURRENT PERIOD THROUGH 10/31/97	CUM. HOURS	CUMULATIVE-TO-DATE THROUGH 10/31/97
WBS 01000 - INVESTIGATION				
DIRECT LABOR	.5	$4.75	57.1	$2,022.86
OH & PROFIT @1.95 X D.L.		$9.26		$3,944.58
ODCS WITHOUT HANDLING		$3.81		$222.56
ODCS W/HANDLING Rate		$.00		$496.00
Markup: 5%		$.00		$24.80
SUBTOTAL:		$17.82		$6,710.80
TOTAL THIS INVOICE:		$17.82		$6,710.80

OK
10/19/97

CLIENT REF.:
INVOICE NO.: 00910959
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR15C

	EMPLOYEE NAME	ADJ. DATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS	BILLING RATE	LABOR BILLING	PREMIUM BILLING
20	SPECIALIST I							
	DANA BOND		.50		.50	28.03	14.01	
	CLASSIFICATION TOTALS		.50		.50		14.01	
	TOTAL LABOR BILLING		.50		.50		14.01	

CLIENT REF.:
INVOICE NO.: 00910959
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRLBR11C

W/E DATE	EMPLOYEE NAME	EMPLOYEE CLASSIFICATION	ADJ. DATE	RATE	REGULAR HOURS	O/T HOURS	TOTAL HOURS
01000	INVESTIGATION						
10/03/97	DANA BOND	SPECIALIST I		28.03	.50		.50
	ITEM TOTALS				.50		.50
	TOTAL LABOR HOURS				.50		.50

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 10/31/97
BY WBS/COST CODE

INVOICE NO.: 00910959
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRFODC03
REF:

REFERENCE NUMBER	DESCRIPTION OF EXPENSES	AMOUNT
01000: INVESTIGATION		
9540	FREIGHT/EXPRESS/POSTAGE	2.71
9550	REPRODUCTION CHARGES	1.10
	INVESTIGATION	3.81
	GRAND TOTAL OTHER DIRECT COSTS	3.81

DETAIL OF OTHER DIRECT COSTS
FOR THE PERIOD ENDING 10/31/97
BY JOB/WBS/COST CODE

CLIENT REF.:
INVOICE NO.: 00910959
PROJECT NO.: 731549-T1
CLIENT NO..: 71275
FORMAT NAME: SBLRODCWTT

REF NO.	EQUIP/ VEND NO.	NAME	INVOICE DATE	DATE WORKED	DESCRIPTION	BATCH NO.	AMOUNT
731549	CANTON DROP FORGE, WASTEWATER						
01000	INVESTIGATION						
9543	POSTAGE						
	00052			10/24/97	POSTAGE	108	.78
	00052			10/24/97	POSTAGE	108	1.93
					ACCOUNT TOTAL		2.71
9551	COPIER CHARGES						
	30270			10/17/97	COPIER CHARGES	96	1.10
					ACCOUNT TOTAL		1.10
					INVESTIGATION		3.81
					JOB 731549 TOTAL		3.81
					TOTAL, OTHER DIRECT COSTS		3.81

G E O A n a l y t i c a l , I n c .

Report Issued To: Canton Drop Forge
PO Box 6902
Canton, Ohio 44706

2(b), 1(c)

GEO Job#	9710092(A)	Project Number:	
Matrix Type:	Water		
Samples Received:	10/17/97	Project Name:	Extended Condensate Sampling
Date Analyzed:	10/23/97		
Analysis Reported:	10/23/97		

OIL AND GREASE, TOTAL, RECOVERABLE

Lab #	Date	Station Location	Result	Reporting Limit
5947	10/13/97	12, Condensate tank test point	50.2	5.0
5948	10/14/94	13, Condensate tank test point	156	5.0
5949	10/15/97	14, Condensate tank test point	199	5.0
5950	10/16/97	15, Condensate tank test point	193	5.0
5951	10/16/97	16, Condensate tank test point	176	5.0
5952	10/17/97	17, Condensate tank test point	140	5.0
			mg/L	mg/L

Analytical Methodology Information

EPA Method 413.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 10/23/97
Continuing Calibration Date:10/23/97
Analyst: J. Woodall

ANALYSIS REVIEWED AND APPROVED BY Laurence M. Stenger

CANTON DROP FORGE
PLANT ENGINEERING
WORK ORDER PRINT REPORT

10/20/97 2(b)

Work Order #: 9700348 (PREVENT) Task #: FS04
CHECK FLOW OF OIL FROM STEAM HAMMER LUBRICATORS

Equipment #... BF0000 Warranty Expires
EQ Description ALL FORGE SHOP HAMMERS
Location..... FORGE SHOP
Department.... FORGE SHOP Current Meter... _____
Cost Center... 36

Originator.... Request Date....
Phone..... Extension.....

Start Date.... 10/26/97 Craft..... OILER
Finish Date... Crew Size..... 1
Priority..... 2.00 Est Labor Hours. 10.00
RFO Code..... _____ ( )
Down Time..... _____ Lot #..... _____

LABOR

Employee	Craft	Name	Hours
557	oiler	Robin Miller	8
		10-27-97	
		10-28-97	

COMMENTS & NOTES

Comments: ROBIN - PLEASE DO THIS ASAP KEITH
oilers are still not within ± OF 3-10 RANGE
~~Notes:~~ AS cold WEATHER APPROACHES SETTING MAY VERY SOON
GET TO cold oil.

TASK INSTRUCTIONS

SEE CDF HAMMER COMPONENT STANDARDS FOR CYLINDER OIL
THIS GIVES YOU A TABLE FOR THE OIL FLOW TO EACH HAMMER
THE UNITS ARE MINUTES/1 OUNCE
IF YOU WANT TO USE MINUTES/QUART MULTIPLY BY 32
EXAMPLE: 3 MINUTES/1 OUNCE IS THE SAME AS 96 MINUTES/1 QUART

0301 - 4, 0501 - 5, 1001 - 5, 1401 - 5.5, 1801 - 6.5, 1807 - 6, 2005 - 6
2003 - 6.5, 2004 - 6, 2503 - 6.5, 2504 - 6.5, 3501 - 7.5
3502 - NOT OPERATING ✓

4943524

5 September 1997

Canton Drop Forge
Extended Condensate Sampling

2(b) 1(c)

Purpose: Collect ten condensate samples over a two week period and analyze for oil & grease to evaluate the variability of the concentration over time.

Set-up: Adjust condensate tank discharge line to maintain maximum level of water in the tank.

Sample collection: Use 1-liter glass bottles supplied by lab. Collect sample directly in sample bottle--do not transfer from another container. Drain approximately one quart of water through sample line to flush line before collecting sample. Fill bottle approximately to shoulder of bottle. Add acid preservative (supplied by lab) and screw lid on tight. Cool to approximately 4^0 C (pack in ice) and maintain at that temperature until sample is picked up by laboratory. Work out pick-up schedule with lab to minimize amount of ice you need without requiring excessive trips by lab. Should pick up at least once per week. Twice per week would be good.

Analysis: Contract with laboratory to analyze samples for Oil & Grease using the partition gravimetric method (EPA Method 413.1). Samples must be analyzed within 28 days of collection (allowable holding time).

HOLD ON ICE?

$50

Laboratories: Quanterra, Inc., North Canton, Rebecca Strait (330) 497-9398
This is the lab used in previous studies. Cost was $45/analysis.

Geo-Analytical, Twinsburg, Amy (216) 963-6990
This lab has quoted $28 per analysis.

$35

1 LITER AMBER
10 CONTAINERS
28 DAY HOLD TIME
REFRIGERATED
PO #99147

Sampling Schedule: Samples should be collected at different times of day to reveal variability that may occur in the oil & grease concentration. One sample should be collected early on Monday when system has been down all week-end and another should be collected late on Friday after system has operated all week. Following is a suggested schedule.

	Mon	Tues	Wed	Thur	Fri
6-8 a.m.	2			3	2
8-10 a.m.		2		2	
10 a.m.-noon	3		2		3
noon-2 p.m.			1	3	
2-4 p.m.	1	3		1	
4-6 p.m.		1	3		1

Note; 1 = week first week; 2 = second week

10
28
~~$280~~
$560

PARSONS ENGINEERING SCIENCE, INC.
19101 Villaview Road, Suite 301 • Cleveland, Ohio 44119 • (216)486-9005 • Fax:(216)486-6119

DATE: 9/9/97

2(6)

TO: Keith Houseknecht
LOCATION: CDF
RAPIDFAX NO.: 330-477-2046
COPIES TO:

FROM: Ed Karlewicz

TOTAL NUMBER OF PAGES 2 (including this cover letter)

IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL BACK AS SOON AS POSSIBLE.

We are herewith transmitting the following:

DATE	NO.	DESCRIPTION
9/9/97	CDF.xls	Environmental Projects Status Spreadsheet

Keith -

Here is Project status spreadsheet for the various PO's. Two are now complete and closed (to new charges for us = 731397-02000 and 731549-02000)

The Lagoon #2 Sampling report is en route to you and should be received tomorrow. Unless it rains (and stops all work), I'll be there first thing Thursday morning to inspect status and review any of these items you wish to discuss.

Ed

JOB NO. 731397.03000

02000C02

2(b)

SAMPLE #	°F TEMP	DATE	TIME	FLOW	PIPE	
1	128	9/22	2:35	NONE	12	
2	120	9/29	2:10	YES	12	PIPE MOD 9/26 FLOW STARTED 9/29
3	155	9/30	4130	LARGE	12	FLOW OUT MUCH GREATER THAN FLOW IN. SYSTEM UPSET DUE TO SHIFT CHANGE
4	114	10/1	12:57	NORMAL	12	
5	104	10/2	4:43	SMALL	12	
6	85	10/3	1:30	NONE	12	BOILER OFF
7	120	10/6	7:40	NORMAL	12	
8	110	10/7	10:00	NORMAL	12	
9	135	10/8	10:29	1 GAL / MIN 12 SEC	12	PUMPED FLOW NOT COUNTED SI PUMP STOPPED
10	145	10/9	8:57		12	
11	100	10/10	7:45	NONE	12	BOILER OFF
12	82	10/13	10:30	1 GAL / 25 SEC	12	LOW FLOW FROM MAIN OPENED VALVE MORE
13	123	10/14	3:55	1 MIN 53 SEC	12	
14	121	10/15	4:25	25 SEC	12	
15	129	10/16	7:30	30 SEC	12	
16	132	10/16	1:37	26 SEC	12	
17	97	10/17	11:36	0 SEC	12	NO FLOW

G E O Analytical, Inc.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD

COMPANY NAME AND ADDRESS: CANTON DROP FORGE, PO Box P 6902, 4525 SOUTHWAY ST SW, CANTON OHIO 44706

PROJECT NUMBER AND DESCRIPTION: EXTENDED CONDENSATE SAMPLING

SAMPLER SIGNATURES:

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Analysis Requested: Oil & Grease 413.1	TEMP	NOTES/GAL
12	10/13/97	10:30 AM		X	CONDENSATE TANK TEST POINT	1	X	82°F	25 SEC
13	10/14/97	3:55 PM		X	" " " "	1	X	123°F	1 MIN 53 SEC
14	10/15/97	4:25 PM		X	" " " "	1	X	121°F	25 SEC
15	10/16/97	7:30 AM		X	" " " "	1	X	129°F	30 SEC
16	10/16/97	1:37 PM		X	" " " "	1	X	132°F	26 SEC
17	10/17/97	11:36 AM		X	" " " "	1	X	97°F	0 SEC

CHAIN OF CUSTODY SIGNATURES *(Name, Company, Date, Time)*

1. Relinquished By: _____ CDF 10/17/97 1:30PM
   Received By: _____ 10-17-97 1:30 PM
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: _____
   Received for Laboratory By: _____

CDF002464

G E O A n a l y t i c a l, I n c.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD

COMPANY NAME AND ADDRESS: CANTON DROP FORGE, PO BOX # 6902, 4575 SOUTHWAY ST SW, CANTON OHIO 44706

SAMPLER SIGNATURES: Keith J. Housenecht

PROJECT NUMBER AND DESCRIPTION: EXTENDED CONDENSATE SAMPLING

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Analysis Requested: OIL & GREASE 413.1	NOTES
1	9/22/97	2:35 PM		X	CONDENSATE TANK TEST POINT	1	X	128°F
2	9/29/97	2:10 PM		X	" " " "	1	X	120°F
3	9/30/97	4:30 PM		X	" " " "	1	X	155°F
4	10/1/97	12:57 PM		X	" " " "	1	X	114°F
5	10/2/97	4:45 PM		X	" " " "	1	X	104°F
6	10/3/97	8:30 PM		X	" " " "	1	X	85°F

CDF002465

CHAIN OF CUSTODY SIGNATURES *(Name, Company, Date, Time)* 2:38 PM

1. Relinquished By: KEITH HOUSENECHT CDF, 10/3/97
   Received By: [illegible] 10-3-97 2145
3. Relinquished By: _____
   Received By: _____

2. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: _____
   Received for Laboratory By: _____

G E O Analytical, Inc.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD

COMPANY NAME AND ADDRESS: CANTON DROP FORGE, PO BOX #6902, 4575 SOUTHWAY ST S.W., CANTON, OHIO 44706

PROJECT NUMBER AND DESCRIPTION: EXTENDED CONDENSATE SAMPLING

SAMPLER SIGNATURES:

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Analysis Requested: Oil & Grease 413.1	NOTES
7	10/6/97	7:40 AM		X	CONDENSATE TANK TEST POINT	1	X	120 °F
8	10/7/97	10:00 AM		X	" " " "	1	X	110 °F
9	10/8/97	10:29		X	" " " "	1	X	135 °F 1 min
10	10/9/97	8:57 AM		X	" " " "	1	X	145 °F
11	10/10/97	7:45 AM		X	" " " "	1	X	100 °F

CHAIN OF CUSTODY SIGNATURES *(Name, Company, Date, Time)*

1. Relinquished By: [illegible] CDF 10/10/97 12:23 p.m.
   Received By: [illegible]
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: _____
   Received for Laboratory By: _____

CDF002466

2(b)

Report Issued To: Canton Drop Forge
PO Box 6902
Canton, Ohio 44706

GEO Job# 9710092(A)
Matrix Type: Water
Samples Received: 10/17/97
Date Analyzed: 10/23/97
Analysis Reported: 10/23/97

Project Number:

Project Name: Extended Condensate Sampling

OIL AND GREASE, TOTAL, RECOVERABLE

Lab #	Date	Station Location	Result	Reporting Limit
5947	10/13/97	12, Condensate tank test point	50.2	5.0
5948	10/14/94	13, Condensate tank test point	156	5.0
5949	10/15/97	14, Condensate tank test point	199	5.0
5950	10/16/97	15, Condensate tank test point	193	5.0
5951	10/16/97	16, Condensate tank test point	176	5.0
5952	10/17/97	17, Condensate tank test point	140	5.0
			mg/L	mg/L

Analytical Methodology Information

EPA Method 413.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 10/23/97
Continuing Calibration Date: 10/23/97
Analyst: J. Woodall

CDF002467

ANALYSIS REVIEWED AND APPROVED BY Terence M. Longo

G E O Analytical, Inc.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD 9710092

CDF002468

COMPANY NAME AND ADDRESS: CANTON DROP FORGE, PO BOX A 6902, 4575 SOUTHWAY ST. SW, CANTON OHIO 44706

PROJECT NUMBER AND DESCRIPTION: EXTENDED CONDENSATE SAMPLING

SAMPLER SIGNATURES:

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Analysis Requested: Oil & Grease 413.1								TEMP	NOTES / GAL
12	10/13/97	10:30 AM		X	CONDENSATE TANK TEST POINT	1	X	59	47						82°F	25 SEC
13	10/14/97	3:55 PM		X	" " " "	1	X	58	45						123°F	1 MIN 53 SEC
14	10/15/97	4:25 PM		X	" " " "	1	X	58	49						121°F	25 SEC
15	10/16/97	7:30 AM		X	" " " "	1	X	58	50						129°F	30 SEC
16	10/16/97	1:37 PM		X	" " " "	1	X	59	51						132°F	26 SEC
17	10/17/97	11:36 AM		X	" " " "	1	X	59	52						97°F	0 SEC
								7:30								
								10/16								

CHAIN OF CUSTODY SIGNATURES *(Name, Company, Date, Time)*

1. Relinquished By: CDF 10/17/97 1:20PM
   Received By: 10-17-97 1:20 pm
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: 10-17-97 2:30
   Received for Laboratory By: 10/17/97 @ 2:30pm.

GEO Analytical, Inc.

Report Issued To: Canton Drop Forge
PO Box 6902
Canton, Ohio 44706
(330)477-2046 (FAX

26

GEO Job# 9710018(A)
Matrix Type: Water
Samples Received: 10/03/97
Date Analyzed: 10/07/97
Analysis Reported: 10/07/97

Project Number:
Project Name: Extended Condensate Sampling

OIL AND GREASE, TOTAL, RECOVERABLE

Lab #	Date	Station Location	Result	Reporting Limit
5671	09/22/97	1, Condensate Tank Test Point	134	5.0
5672	09/29/97	2, Condensate Tank Test Point	35.2	5.0
5673	09/30/97	3, Condensate Tank Test Point	14.2	5.0
5674	10/01/97	4, Condensate Tank Test Point	23.9	5.0
5675	10/02/97	5, Condensate Tank Test Point	57.0	5.0
5676	10/03/97	6, Condensate Tank Test Point	111	5.0
			mg/L	mg/L

Analytical Methodology Information

EPA Method 413.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 10/07/97
Continuing Calibration Date:10/07/97
Analyst: J. Woodall

ANALYSIS REVIEWED AND APPROVED BY Christie Maxim

CDF002469

9263 Ravenna Rd. • Suite A-7 • Twinsburg, Ohio 44087 • Phone 330 963 6990 • Fax 330 963 6975

G E O Analytical, Inc.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD 9710018

CDF002470

COMPANY NAME AND ADDRESS: CANTON DROP FORGE, PO BOX # 6902, 4675 SOUTHWAY ST SW, CANTON OHIO 44706

SAMPLER SIGNATURES: Keith J. Housenecht

PROJECT NUMBER AND DESCRIPTION: EXTENDED CONDENSATE SAMPLING

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Analysis Requested: Oil & Grease 413.1								NOTES
1	9/22/97	2:35 PM		X	CONDENSATE TANK TEST POINT	1	X		56	71					128°F
2	9/29/97	2:10 PM		X	" " " "	1	X		56	72					120°F
3	9/30/97	4:30 PM		X	" " " "	1	X		56	73					155°F
4	10/1/97	12:57 PM		X	" " " "	1	X		56	74					114°F
5	10/2/97	4:43 PM		X	" " " "	1	X		56	75					104°F
6	10/3/97	1:30 PM		X	" " " "	1	X		56	76					85°F

CHAIN OF CUSTODY SIGNATURES *(Name, Company, Date, Time)* 2:48 PM

1. Relinquished By: KEITH HOUSENECHT, CDF, 10/3/97
   Received By: [illegible] 10-3-97 2:48
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: [illegible] 10-3-97 4:20
   Received for Laboratory By: [illegible] GEO 10/3/97 @ 4:20

G E O Analytical, Inc.

Report Issued To: Canton Drop Forge
PO Box 6902
Canton, Ohio 44706
(330) 477-2046 (FAX)

2(b)

GEO Job# 9710062(A)
Matrix Type: Water
Samples Received: 10/10/97
Date Analyzed: 10/14-15/97
Analysis Reported: 10/15/97

Project Number:
Project Name: Extended Condensate Sampling

OIL AND GREASE, TOTAL, RECOVERABLE

Lab #	Date	Station Location	Result	Reporting Limit
5842	10/06/97	7, Condensate Tank Test Point	114	5.0
5843	10/07/97	8, Condensate Tank Test Point	33.1	5.0
5844	10/08/97	9, Condensate Tank Test Point	185	5.0
5845	10/09/97	10, Condensate Tank Test Point	317	5.0
5846	10/10/97	11, Condensate Tank Test Point	213	5.0
			mg/L	mg/L

Analytical Methodology Information

EPA Method 413.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 10/14-15/97
Continuing Calibration Date: 10/14-15/97
Analyst: J. Woodall

ANALYSIS REVIEWED AND APPROVED BY

CDF002471

G E O Analytical, Inc.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD 9710062

CDF002472

COMPANY NAME AND ADDRESS: CANTON DROP FORGE, PO BOX 6902, 4575 SOUTHWAY ST S.W., CANTON, OHIO 44706

PROJECT NUMBER AND DESCRIPTION: EXTENDED CONDENSATE SAMPLING

SAMPLER SIGNATURES:

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Oil & Grease 413.1		5812	5842					NOTES
7	10/6/97	7:40 AM		X	CONDENSATE TANK TEST POINT	1	X		58	42					120 °F
8	10/7/97	10:00 AM		X	" " " "	1	X		58	43					110 °F
9	10/8/97	10:28 AM		X	" " " "	1	X		58	44					135 °F 1 min 12 sec
10	10/9/97	8:57 AM		X	" " " "	1	X		58	45					145 °F
11	10/10/97	7:45 AM		X	" " " "	1	X		58	46					100 °F

CHAIN OF CUSTODY SIGNATURES (Name, Company, Date, Time)

1. Relinquished By: HOUSEKNECHT, CDF, 10/10/97 1223 PM
   Received By: C. Willoughby GEO 10/10/97 @ 12:23 PM
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: C. Willoughby GEO 10/10/97 @ 1:53 PM.
   Received for Laboratory By: Amy Oneal 10.10.97 1:50 PM.

G E O A n a l y t i c a l , I n c .

2(b)

Report Issued To: Canton Drop Forge
PO Box 6902
Canton, Ohio 44706
(330)477-2046 (FAX

GEO Job# 9710018(A)
Matrix Type: Water
Samples Received: 10/03/97
Date Analyzed: 10/07/97
Analysis Reported: 10/07/97

Project Number:

Project Name: Extended Condensate Sampling

OIL AND GREASE, TOTAL, RECOVERABLE

Lab #	Date	Station Location	Result	Reporting Limit
5671	09/22/97	1, Condensate Tank Test Point	134	5.0
5672	09/29/97	2, Condensate Tank Test Point	35.2	5.0
5673	09/30/97	3, Condensate Tank Test Point	14.2	5.0
5674	10/01/97	4, Condensate Tank Test Point	23.9	5.0
5675	10/02/97	5, Condensate Tank Test Point	57.0	5.0
5676	10/03/97	6, Condensate Tank Test Point	111	5.0
			mg/L	mg/L

Analytical Methodology Information

EPA Method 413.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 10/07/97
Continuing Calibration Date: 10/07/97
Analyst: J. Woodall

ANALYSIS REVIEWED AND APPROVED BY Christi Thaxton

G E O A n a l y t i c a l , I n c .

Report Issued To: Canton Drop Forge
PO Box 6902
Canton, Ohio 44706
(330) 477-2046 (FAX)

2(b)

GEO Job#	9710062(A)	Project Number:	
Matrix Type:	Water		
Samples Received:	10/10/97	Project Name:	Extended Condensate Sampling
Date Analyzed:	10/14-15/97		
Analysis Reported:	10/15/97		

OIL AND GREASE, TOTAL, RECOVERABLE

Lab #	Date	Station Location	Result	Reporting Limit
5842	10/06/97	7, Condensate Tank Test Point	114	5.0
5843	10/07/97	8, Condensate Tank Test Point	33.1	5.0
5844	10/08/97	9, Condensate Tank Test Point	185	5.0
5845	10/09/97	10, Condensate Tank Test Point	317	5.0 } BRD
5846	10/10/97	11, Condensate Tank Test Point	213	5.0 } BRD
			mg/L	mg/L

Analytical Methodology Information

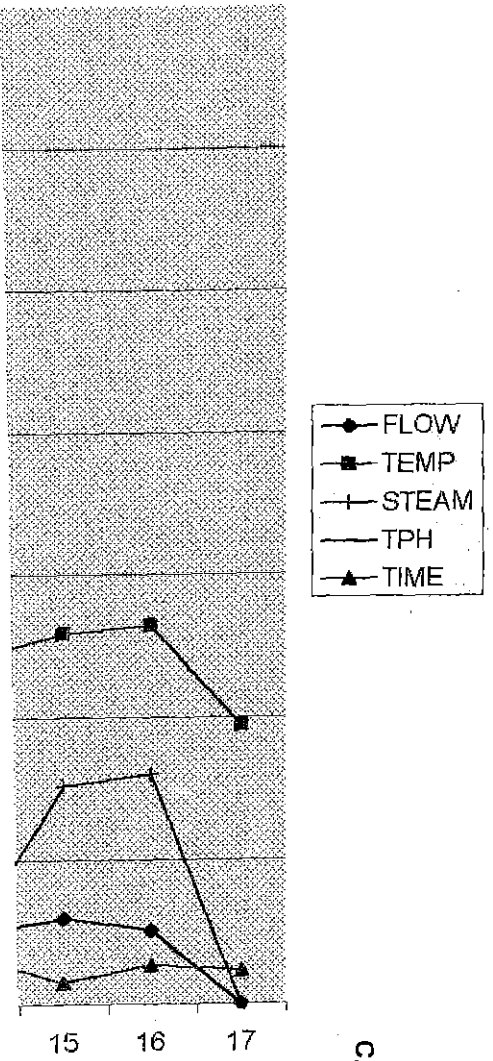
EPA Method 413.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 10/14-15/97
Continuing Calibration Date: 10/14-15/97
Analyst: J. Woodall

ANALYSIS REVIEWED AND APPROVED BY Terence M. Hayes

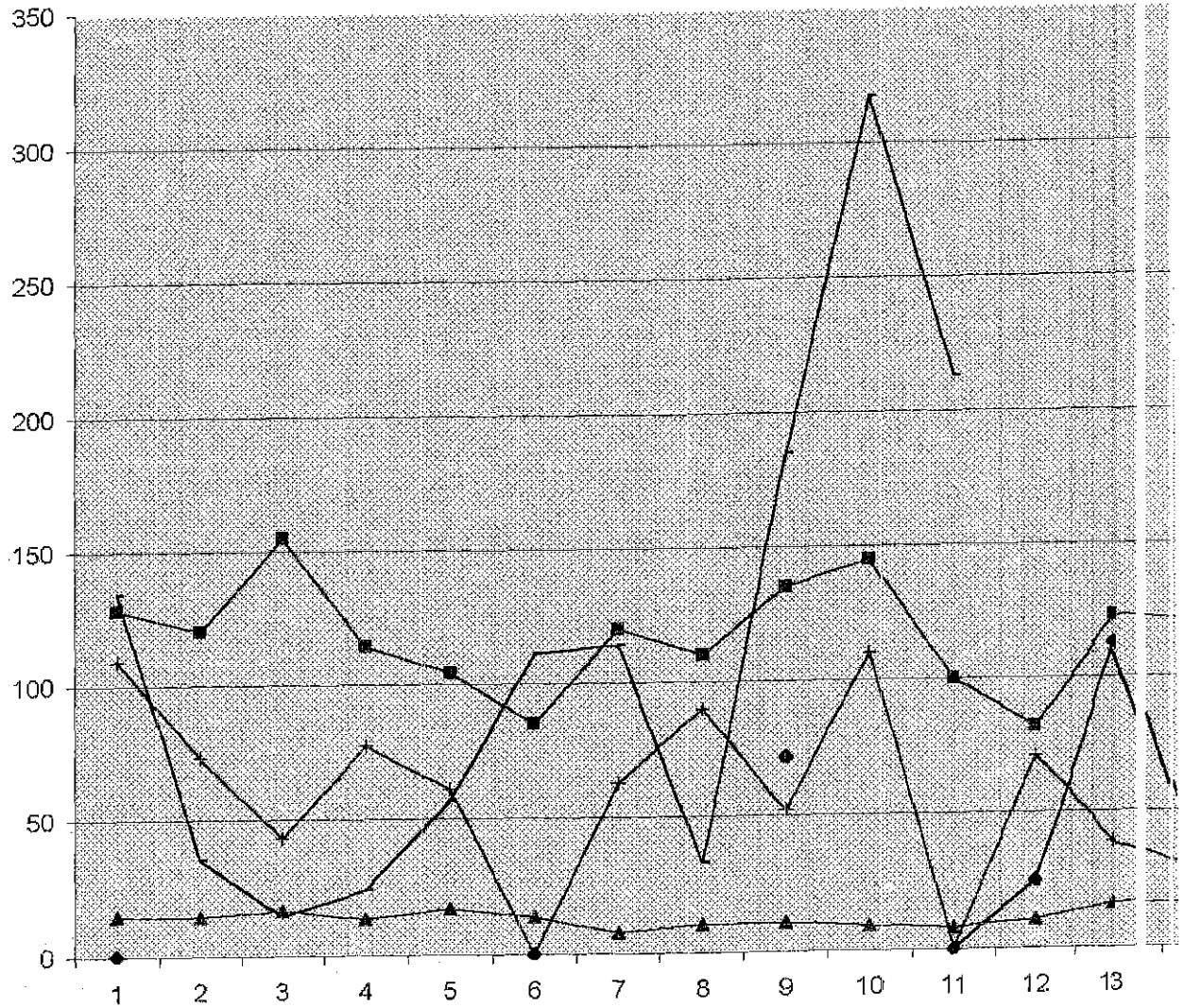
2(b)

TPH VARIATIONS
CDF002475
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
13



SAMPLE NUMBER	DATE	DAY		TIME	FLOVV	TEMP	AMBIENT TEMP	AMBIENT HUMIDITY	BC OI
1	22-Sep	MON	14:35	14.58	0	128			
2	29-Sep	MON	14:10	14.17		120			
3	30-Sep	TUE	16:30	16.5		155			
4	1-Oct	WED	12:57	12.95		114			
5	2-Oct	THU	16:43	16.72		104			
6	3-Oct	FRI	13:30	13.5	0	85			
7	6-Oct	MON	7:40	7.67		120			
8	7-Oct	TUE	10:00	10		110			
9	8-Oct	WED	10:29	10.48	72	135			
10	9-Oct	THU	8:57	8.95		145			
11	10-Oct	FRI	7:45	7.75	0	100			
12	13-Oct	MON	10:30	10.5	25	82			
13	14-Oct	TUE	15:55	15.92	113	123			
14	15-Oct	WED	16:25	16.42	25	121			
15	16-Oct	THU	7:30	7.5	30	129			
16	16-Oct	THU	13:37	13.62	26	132			
17	17-Oct	FRI	11:36	11.6	0	97			

TPH VARIATIONS



CDF002477

#2	BOILER#3		
JT	OUTPUT	STEAM	TPH
55	54	109	134
36	37	73	35.2
23	20	43	14.2
37	40	77	23.9
29	32	61	57
0	0	0	111
30	33	63	114
44	46	90	33.1
25	27	52	185
55	55	110	317
0	0	0	213
34	37	71	
18	21	39	
10	17	27	
38	38	76	
38	42	80	
0	0	0	